

Appendix M Municipal, Rural Domestic, and Industrial Water Use

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1. Introduction

The population of Douglas County has been growing rapidly since about 1940 with a slowdown in the 1980s when timber production began to decrease. In more recent years, the population has been growing at an increasing rate. Table 1- 1 shows the population and percent growth over time for the County and for the State of Oregon for comparison. The Douglas County population grew by about 6.1 percent between 1990 and 2000 and by another 4.7 percent between 2000 and 2006. This growth is expected to continue if not increase in the future. With increases in population, demand for water is also expected to increase.

Census year	Douglas County		Oregon	
	Population	Percent increase	Population	Percent increase
1930	21,965	3.0	953,786	21.8
1940	25,728	17.1	1,089,684	14.2
1950	54,549	112.0	1,521,341	39.6
1960	68,458	25.5	1,768,687	16.3
1970	71,743	4.8	2,091,385	18.2
1980	93,748	30.7	2,633,105	25.9
1990	94,649	1.0	2,842,321	7.9
2000	100,399	6.1	3,421,399	20.4
2006	105,117	4.7 ¹	3,700,758	8.2 ¹
¹ Percent increase is based on only six years of growth rather than the full ten years as in previous decades. Source: U.S. Census Bureau website at www.census.gov .				

Table 1- 1: Population and percent growth of Douglas County and the State of Oregon since 1930.

Natural resources such as available water have influenced settlement patterns and will be a greater determinant of where and how much population growth will occur in the future. Already there are water shortages in some communities within the County; and without a method of meeting these demands, traditional settlement patterns may need to be altered. In addition, water demand in many areas is increasing at a greater rate than the population (per capita use is going up), compounding the potential water shortage.

This section summarizes current and projected populations for different communities within the sub-basins. Using this population information along with current municipal water use, projections for future municipal water use are calculated by area. Rural domestic and industrial water use are also summarized and future need is projected.

Population projections are determined using two sources: the United States Census Bureau, and the Douglas County Planning Department population assessment that is summarized in the Douglas County Comprehensive Plan.¹

1.A. Municipal

1.A.1. Population

The majority of the population in Douglas County is located within the Sutherlin, Roseburg, Winston, Myrtle Creek corridor, and concentrated in areas with public water and/or sewer services. The County also has several urban unincorporated areas with high growth rates. Over 30 percent of the population is within the South Umpqua sub-basin and dependent on water from the South Umpqua River. Based on the percentage of homes built since 1990 according to the 2000 U.S. Census data, the cities with the largest growth within the County are Sutherlin, Roseburg, Winston, and Myrtle Creek, and the unincorporated areas of Green and Tri City.

The projected average annual growth for each city in Douglas County is listed in Table 1.A-1. These numbers were estimated by the Douglas County Population Coordination Committee established to determine population growth for the County. Each jurisdiction reviewed these estimates based on housing starts, development trends, and infrastructure capacity. The total County growth rate and the rural unincorporated area growth rate were agreed upon by the Coordination Committee.

Community	Average annual projected growth	Community	Average annual projected growth
Reedsport	1.7 %	Winston	3.0 %
Yoncalla	2.5 %	Myrtle Creek	2.5 %
Drain	1.0 %	Canyonville	3.5 %
Elkton	2.0 %	Riddle	1.5 %
Oakland	1.0 %	Glendale	1.0 %
Sutherlin	2.7 %		
Roseburg	2.5 %	Douglas County	1.5 %
Source: Population Element Support Document (Douglas County Planning Dept. 2004).			

Table 1.A-1: Estimated average annual growth rate for each community within Douglas County.

The Douglas County Planning Department uses defined sub-areas for their population assessments that differ from the water sub-basins used in this water resource management plan. Table 1.A-2 lists the rural growth rate by Planning Department sub-area and how each sub-area correlates to the water sub-basins in this assessment.

¹ Details of the Douglas County Planning Department calculations used in this analysis are found in the Population Element Support Document updated in October, 2004.

County Planning Department Sub-Area	Water Sub-basins	Average annual rural growth rate¹
Coastal	includes most of sub-basin A except upper portions of Smith River drainage, and small portion of B between Elkton and Scottsburg	-0.5 %
North	includes upper Smith River drainage from sub-basin A, part of sub-basin C including areas around Elkton, Drain, and Yoncalla, and small part of sub-basin B south of Elkton	0.2 %
Central	includes part of sub-basins B, C, D, E, and F including areas around Oakland, Sutherlin, Roseburg, and Winston	1.4 %
South	includes mostly a large portion of sub-basin D and smaller portions of E	2.3 %
All sub-areas²	includes all sub-basins except the upper areas of the North Umpqua in Sub-basin B	1.5 %
¹ Based on actual rural growth rate from 1980 to 1990 according to the U.S. Census. ² The upper North Umpqua area of Sub-basin B is not included in the County Planning Department sub-areas for population growth since the vast majority is federal land with no potential for growth. Source: Calculated from information in Table 3 of the Population Element Support Document (Douglas County Planning Dept. 2004).		

Table 1.A-2: Average annual growth rate for rural unincorporated areas in Douglas County.

There are 17 primary water providers operating in Douglas County. Water providers included for this analysis supply water to at least 100 services. They include cities, water districts, and water associations collectively referred to in this document as water districts. Each incorporated city within the County operates a water system that provides water for municipal use to its population. There are also several water associations and districts that service areas within and around several cities, and for the unincorporated communities of Glide and Green.

To calculate the population that is currently served by each water district, the current number of services provided by each district for water year 2006 was multiplied by the average number of people per household for the community the district serves. The average number of people per household is based on the 2000 U.S. Census data for each community. Based on these calculations, these primary water districts and associations serve an estimated 75,494 people within Douglas County (over 73 percent of the population).

There are also eight water districts that provide community water to small groups located throughout the County. In total, they serve an estimated 1,170 additional people. The remaining rural population in the County primarily uses ground water from private wells or surface water from individual domestic water rights.

1.A.2. Water Use

Estimates of municipal water use in the County are based on monthly raw water diversion amounts from water years 2000 through 2006 by each primary water district, and on the average number of services in each of those years.²

Monthly municipal water use for each primary water district is shown in Tables 1.A-3 by sub-basin for water years 2000 through 2006. Data were obtained from Water Use Reports provided by the Oregon Water Resources Department; and from individual water districts and water associations. There are no water districts or associations within Sub-basin F. For each water district, the data are used to calculate the average monthly use, the percentage of the year's water use for each month, and the monthly ratio of average use compared to the month of highest average use.

July and August are consistently the months of highest use for all water districts with July being the highest use month for all except the South Umpqua Water Association and the City of Yoncalla, both of which peak in August. As expected, use is the lowest in the winter and early spring months from January through April. In most districts water use in several winter and spring months are only 35 to 40 percent of the peak summer use in July and August. Communities including Drain and Glendale have less variation where winter and spring water use is over 70 percent of peak summer use.

² In some communities, data on the average numbers of services were not available for the entire period. In these instances, the average per capita use is based only on the years where the average numbers of services were available. However, the total average annual, monthly, and daily uses for the district are based on the entire period unless noted otherwise.

Tables 1.A-3: Monthly municipal water use for incorporated cities and large water districts for water years 2000 - 2006.**Sub-basin A**

City of Reedsport Clear Lake; Edna Lake
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<u>Water year</u>	<u>Unit</u>	<u>Oct</u>	<u>Nov</u>	<u>Dec</u>	<u>Jan</u>	<u>Feb</u>	<u>Mar</u>	<u>Apr</u>	<u>May</u>	<u>Jun</u>	<u>Jul</u>	<u>Aug</u>	<u>Sep</u>	<u>Total</u>
2006	AFT	91.8	93.6	96.4	80.4	74.0	89.9	70.9	119.4	113.5	158.0	162.7	114.2	1,265
2005	AFT	93.3	99.7	91.5	118.2	86.8	93.6	85.3	94.2	102.5	138.1	159.3	114.5	1,277
2004	AFT	96.7	81.9	88.7	88.7	88.4	85.9	78.3	89.3	105.3	186.9	150.1	108.6	1,249
2003	AFT	102.4	79.4	93.7	92.1	74.5	82.4	75.5	79.8	132.9	172.0	152.2	121.8	1,259
2002	AFT	159.4	101.1	82.5	76.4	74.4	81.0	99.8	99.2	111.6	150.4	156.5	132.7	1,325
2001	AFT	142.9	120.3	106.3	143.8	106.1	116.4	118.5	148.9	149.7	283.7	207.4	172.2	1,816
2000	AFT	142.9	120.3	106.3	143.8	106.1	116.4	118.5	148.9	149.7	283.7	207.4	172.2	1,816
sum		829.4	696.4	665.3	743.5	610.2	665.8	646.8	779.6	865.2	1,372.9	1,195.4	936.2	10,007
average		118.5	99.5	95.0	106.2	87.2	95.1	92.4	111.4	123.6	196.1	170.8	133.7	1,430
percent of year		8.3%	7.0%	6.6%	7.4%	6.1%	6.7%	6.5%	7.8%	8.6%	13.7%	11.9%	9.4%	100%
ratio		0.60	0.51	0.48	0.54	0.44	0.48	0.47	0.57	0.63	1.00	0.87	0.68	

Sub-basin B

City of Elkton Umpqua River
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<u>Water year</u>	<u>Unit</u>	<u>Oct</u>	<u>Nov</u>	<u>Dec</u>	<u>Jan</u>	<u>Feb</u>	<u>Mar</u>	<u>Apr</u>	<u>May</u>	<u>Jun</u>	<u>Jul</u>	<u>Aug</u>	<u>Sep</u>	<u>Total</u>
2006	AFT	5.3	4.5	6.0	4.3	4.4	5.1	2.1	4.2	4.4	6.3	5.6	4.0	56
2005	AFT	3.9	3.4	3.7	4.2	3.0	3.9	4.3	4.3	4.6	8.4	9.5	5.8	59
2004	AFT	4.0	3.2	3.6	3.7	3.0	2.5	3.1	3.8	5.0	8.3	7.4	3.9	52
2003	AFT	3.0	2.9	3.0	2.6	2.3	2.5	2.6	2.5	5.7	6.8	6.6	5.0	46
2002	AFT	2.5	2.4	2.5	2.6	2.2	2.6	2.4	3.6	4.8	7.0	6.2	4.9	44
2001	AFT	2.8	2.4	2.4	2.4	1.8	2.3	2.1	3.6	3.5	5.9	4.4	3.4	37
2000	AFT	3.1	2.5	2.1	2.2	2.0	2.3	2.7	3.0	4.5	6.1	6.1	3.8	40
sum		24.6	21.3	23.4	21.9	18.7	21.2	19.3	25.1	32.6	48.8	45.8	30.9	334
average		3.5	3.0	3.3	3.1	2.7	3.0	2.8	3.6	4.7	7.0	6.5	4.4	48
percent of year		7.4%	6.4%	7.0%	6.6%	5.6%	6.4%	5.8%	7.5%	9.8%	14.6%	13.7%	9.3%	100%
ratio		0.50	0.44	0.48	0.45	0.38	0.43	0.39	0.51	0.67	1.00	0.94	0.63	

Sub-basin B - continued

Glide Water Association North Umpqua River

<u>Water year</u>	<u>Unit</u>	<u>Oct</u>	<u>Nov</u>	<u>Dec</u>	<u>Jan</u>	<u>Feb</u>	<u>Mar</u>	<u>Apr</u>	<u>May</u>	<u>Jun</u>	<u>Jul</u>	<u>Aug</u>	<u>Sep</u>	<u>Total</u>
2006	AFT	14.1	11.0	12.4	11.8	9.8	11.2	11.0	13.5	15.3	20.4	19.7	14.5	165
2005	AFT	12.0	10.7	11.9	10.6	10.0	11.3	11.0	12.7	12.4	17.6	20.4	16.3	157
2004	AFT	11.6	10.4	11.8	11.4	10.1	11.8	12.8	14.1	15.4	20.1	17.9	13.3	161
2003	AFT	12.6	11.6	13.0	12.6	10.8	11.0	11.0	13.4	19.3	22.3	17.7	14.0	169
2002	AFT	14.6	12.0	12.1	11.9	10.8	11.6	12.5	14.2	17.9	20.7	20.4	16.4	175
2001	AFT	13.3	12.6	13.0	12.1	10.1	11.6	11.2	14.6	14.5	19.2	18.4	16.9	168
2000	AFT	15.1	12.1	11.9	11.6	10.9	12.3	14.1	14.2	17.1	18.5	19.9	14.6	172
sum		93.4	80.3	86.1	82.0	72.5	80.8	83.5	96.6	111.9	138.9	134.4	106.1	1,166
average		13.3	11.5	12.3	11.7	10.4	11.5	11.9	13.8	16.0	19.8	19.2	15.2	167
percent of year		8.0%	6.9%	7.4%	7.0%	6.2%	6.9%	7.2%	8.3%	9.6%	11.9%	11.5%	9.1%	100%
ratio		0.67	0.58	0.62	0.59	0.52	0.58	0.60	0.70	0.81	1.00	0.97	0.76	

City of Roseburg North Umpqua River
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<u>Water year</u>	<u>Unit</u>	<u>Oct</u>	<u>Nov</u>	<u>Dec</u>	<u>Jan</u>	<u>Feb</u>	<u>Mar</u>	<u>Apr</u>	<u>May</u>	<u>Jun</u>	<u>Jul</u>	<u>Aug</u>	<u>Sep</u>	<u>Total</u>
2006	AFT	444.7	380.0	390.3	388.3	350.0	378.1	389.9	572.4	627.9	876.3	850.0	654.7	6,303
2005	AFT	449.3	379.9	383.8	382.9	348.3	405.7	383.8	429.8	521.5	818.5	899.4	660.6	6,063
2004	AFT	446.9	333.8	340.8	339.5	316.6	359.2	392.1	480.6	563.3	772.8	748.4	506.9	5,601
2003	AFT	410.0	324.8	323.9	321.8	289.3	326.6	328.2	420.5	695.4	843.5	768.7	577.1	5,630
2002	AFT	451.6	307.3	340.0	340.8	309.8	342.9	337.9	471.2	616.1	786.9	766.4	583.5	5,655
2001	AFT	410.2	333.8	331.8	338.0	302.0	328.6	328.6	516.8	567.8	713.4	681.8	539.7	5,393
2000	AFT	445.0	329.8	339.7	337.7	307.8	333.3	352.6	419.0	651.7	765.8	761.7	533.9	5,578
sum		3,057.7	2,389.5	2,450.4	2,449.0	2,223.8	2,474.5	2,513.1	3,310.4	4,243.7	5,577.2	5,476.5	4,056.3	40,222
average		436.8	341.4	350.1	349.9	317.7	353.5	359.0	472.9	606.2	796.7	782.4	579.5	5,746
percent of year		7.6%	5.9%	6.1%	6.1%	5.5%	6.2%	6.2%	8.2%	10.6%	13.9%	13.6%	10.1%	100%
ratio		0.55	0.43	0.44	0.44	0.40	0.44	0.45	0.59	0.76	1.00	0.98	0.73	

Sub-basin B - continued

Umpqua Basin Water Association (UBWA) North Umpqua River

<u>Water year</u>	<u>Unit</u>	<u>Oct</u>	<u>Nov</u>	<u>Dec</u>	<u>Jan</u>	<u>Feb</u>	<u>Mar</u>	<u>Apr</u>	<u>May</u>	<u>Jun</u>	<u>Jul</u>	<u>Aug</u>	<u>Sep</u>	<u>Total</u>
2006	AFT	91.5	74.6	83.2	86.4	74.5	85.1	82.9	119.1	137.7	178.5	165.5	128.1	1,307
2005	AFT	86.5	79.2	79.5	78.7	71.9	77.3	79.8	96.3	110.6	163.1	180.2	127.6	1,231
2004	AFT	88.0	76.3	76.3	78.0	68.8	76.7	86.3	98.8	123.3	171.4	157.0	105.2	1,206
2003	AFT	88.1	76.0	77.2	73.6	65.2	72.2	71.3	88.3	137.0	161.6	147.2	118.2	1,176
2002	AFT	84.4	79.8	76.8	76.0	69.3	78.0	82.8	102.3	127.4	158.8	151.5	129.6	1,217
2001	AFT	84.0	74.4	76.8	76.6	66.4	76.2	72.8	109.7	107.2	132.9	126.5	109.1	1,113
2000	AFT	91.8	74.1	86.1	85.4	71.4	79.5	79.9	94.9	126.2	148.7	143.7	105.3	1,187
sum		614.3	534.5	555.9	554.7	487.5	545.0	555.8	709.4	869.4	1115.1	1071.5	823.0	8,436
average		87.8	76.4	79.4	79.2	69.6	77.9	79.4	101.3	124.2	159.3	153.1	117.6	1,205
percent of year		7.3%	6.3%	6.6%	6.6%	5.8%	6.5%	6.6%	8.4%	10.3%	13.2%	12.7%	9.8%	100%
ratio		0.55	0.48	0.50	0.50	0.44	0.49	0.50	0.64	0.78	1.00	0.96	0.74	

Sub-basin C

City of Drain Bear Creek Reservoir, Bear Creek

<u>Water year</u>	<u>Unit</u>	<u>Oct</u>	<u>Nov</u>	<u>Dec</u>	<u>Jan</u>	<u>Feb</u>	<u>Mar</u>	<u>Apr</u>	<u>May</u>	<u>Jun</u>	<u>Jul</u>	<u>Aug</u>	<u>Sep</u>	<u>Total</u>
2006	AFT	18.3	17.7	18.6	19.2	15.6	18.6	18.5	21.4	21.0	28.2	27.6	23.1	248
2005	AFT	22.3	22.8	23.0	21.4	16.2	21.2	17.8	17.8	19.2	26.1	29.9	20.7	258
2004	AFT	18.9	18.5	18.2	17.1	17.9	21.2	23.0	16.4	20.3	29.2	30.4	21.7	253
2003	AFT	18.2	18.3	20.2	21.1	17.5	18.8	18.2	21.2	23.1	26.6	25.9	23.6	253
2002	AFT	34.3	21.1	22.1	23.5	21.8	21.9	17.7	18.6	23.2	27.1	23.9	22.1	277
2001	AFT	34.2	34.8	37.1	37.1	30.8	32.6	29.6	32.6	29.2	35.8	31.3	34.3	399
2000	AFT	36.1	33.8	36.1	38.0	32.4	34.6	33.6	35.1	37.5	43.5	42.1	35.5	438
sum		182.3	167.0	175.3	177.3	152.2	168.9	158.5	163.0	173.5	216.5	211.1	181.1	2,127
average		26.0	23.9	25.0	25.3	21.7	24.1	22.6	23.3	24.8	30.9	30.2	25.9	304
percent of year		8.6%	7.9%	8.2%	8.3%	7.2%	7.9%	7.5%	7.7%	8.2%	10.2%	9.9%	8.5%	100%
ratio		0.84	0.77	0.81	0.82	0.70	0.78	0.73	0.75	0.80	1.00	0.97	0.84	

Sub-basin C - continued

City of Oakland Calapooya Creek

<u>Water year</u>	<u>Unit</u>	<u>Oct</u>	<u>Nov</u>	<u>Dec</u>	<u>Jan</u>	<u>Feb</u>	<u>Mar</u>	<u>Apr</u>	<u>May</u>	<u>Jun</u>	<u>Jul</u>	<u>Aug</u>	<u>Sep</u>	<u>Total</u>
2006	AFT	16.4	14.5	15.7	12.8	11.0	12.4	15.0	18.5	19.5	26.4	26.2	21.2	210
2005	AFT	13.3	14.1	16.1	15.5	11.7	12.5	13.8	15.1	16.3	21.1	19.1	13.9	183
2004	AFT	17.1	11.1	12.2	12.8	12.8	12.7	14.4	14.3	17.9	21.1	15.7	13.9	176
2003	AFT	11.5	9.8	9.2	9.8	9.5	10.3	11.1	13.2	19.3	20.0	19.9	18.7	162
2002	AFT	10.8	9.4	9.4	9.0	8.4	8.7	9.2	11.7	15.9	19.6	16.9	15.1	144
2001	AFT	11.3	13.2	9.8	10.3	10.2	10.6	8.9	14.5	14.9	18.5	17.8	15.8	156
2000	AFT	14.2	12.1	11.5	11.0	10.4	11.0	11.4	13.7	20.1	24.4	24.2	20.6	185
sum		94.5	84.2	83.9	81.2	74.0	78.2	83.8	101.0	123.9	151.1	139.8	119.3	1,215
average		13.5	12.0	12.0	11.6	10.6	11.2	12.0	14.4	17.7	21.6	20.0	17.0	174
percent of year		7.8%	6.9%	6.9%	6.7%	6.1%	6.4%	6.9%	8.3%	10.2%	12.4%	11.5%	9.8%	100%
ratio		0.63	0.56	0.56	0.54	0.49	0.52	0.55	0.67	0.82	1.00	0.92	0.79	

City of Yoncalla Wilson Creek and Adams Creek
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<u>Water year</u>	<u>Unit</u>	<u>Oct</u>	<u>Nov</u>	<u>Dec</u>	<u>Jan</u>	<u>Feb</u>	<u>Mar</u>	<u>Apr</u>	<u>May</u>	<u>Jun</u>	<u>Jul</u>	<u>Aug</u>	<u>Sep</u>	<u>Total</u>
2006	AFT	13.2	11.8	14.5	13.1	10.9	12.1	13.5	15.4	17.8	20.8	30.6	24.1	198
2005	AFT	13.0	11.9	13.9	12.3	11.4	12.3	10.9	12.2	17.5	22.8	26.7	22.1	187
2004	AFT	15.6	12.0	13.6	15.0	11.4	13.2	13.1	12.1	15.9	21.5	26.9	22.1	193
2003	AFT	13.8	15.1	15.6	15.4	12.0	12.7	12.7	12.6	16.6	19.2	23.4	23.0	192
2002	AFT	15.4	11.6	12.3	11.8	11.9	12.0	11.7	12.0	15.0	21.1	20.0	17.9	173
2001	AFT	12.5	10.7	11.8	12.7	11.1	11.7	11.6	12.2	17.4	22.7	25.0	22.7	182
2000	AFT	14.2	9.1	10.1	12.7	13.1	12.4	11.9	13.1	16.9	21.5	22.2	15.3	172
sum		97.7	82.3	91.8	92.9	81.8	86.4	85.5	89.6	117.3	149.5	174.7	147.2	1,297
average		14.0	11.8	13.1	13.3	11.7	12.3	12.2	12.8	16.8	21.4	25.0	21.0	185
percent of year		7.5%	6.3%	7.1%	7.2%	6.3%	6.7%	6.6%	6.9%	9.0%	11.5%	13.5%	11.4%	100%
ratio		0.56	0.47	0.53	0.53	0.47	0.49	0.49	0.51	0.67	0.86	1.00	0.84	

Sub-basin C – continued

Sutherlin Cooper Creek; Calapooya Creek; Cooper Creek Reservoir														
<u>Water year</u>	<u>Unit</u>	<u>Oct</u>	<u>Nov</u>	<u>Dec</u>	<u>Jan</u>	<u>Feb</u>	<u>Mar</u>	<u>Apr</u>	<u>May</u>	<u>Jun</u>	<u>Jul</u>	<u>Aug</u>	<u>Sep</u>	<u>Total</u>
2006	AFT	114.7	99.3	106.9	108.7	96.0	109.8	105.1	148.0	179.2	292.5	278.2	168.8	1,807
2005	AFT	121.0	106.2	109.3	104.4	82.7	106.3	105.5	120.4	144.5	268.8	301.9	170.6	1,742
2004	AFT	122.6	99.9	100.7	99.6	82.7	106.1	107.7	130.1	153.9	222.5	206.7	140.7	1,573
2003	AFT	117.2	97.5	96.0	97.3	82.7	95.8	100.7	121.0	217.8	293.9	267.0	176.7	1,764
2002	AFT	111.0	94.4	97.9	95.9	82.7	94.1	97.1	121.5	162.5	236.6	242.4	177.8	1,614
2001	AFT	120.4	98.1	97.0	91.8	85.3	93.8	95.4	139.2	160.7	230.2	223.0	151.3	1,586
2000	AFT	116.3	94.1	96.4	97.2	107.9	115.9	104.6	112.0	172.1	204.2	199.8	149.2	1,570
sum		823.3	689.6	704.2	694.9	619.9	721.7	716.1	892.3	1,190.6	1,748.8	1,719.1	1,135.1	11,656
average		117.6	98.5	100.6	99.3	88.6	103.1	102.3	127.5	170.1	249.8	245.6	162.2	1,665
percent of year		7.1%	5.9%	6.0%	6.0%	5.3%	6.2%	6.1%	7.7%	10.2%	15.0%	14.7%	9.7%	100%
ratio		0.47	0.39	0.40	0.40	0.35	0.41	0.41	0.51	0.68	1.00	0.98	0.65	

Sutherlin has some municipal water right from the North Umpqua River in sub-basin B, but has not used this water to date.

Sub-basin D

Roberts Creek Water District South Umpqua River														
<u>Water year</u>	<u>Unit</u>	<u>Oct</u>	<u>Nov</u>	<u>Dec</u>	<u>Jan</u>	<u>Feb</u>	<u>Mar</u>	<u>Apr</u>	<u>May</u>	<u>Jun</u>	<u>Jul</u>	<u>Aug</u>	<u>Sep</u>	<u>Total</u>
2006	AFT	87.3	72.5	77.2	70.3	65.7	71.8	72.0	110.8	125.6	181.7	169.7	131.8	1,236
2005	AFT	105.7	84.3	86.3	81.2	108.5	67.2	75.0	77.9	86.3	141.6	168.4	161.0	1,243
2004	AFT	98.8	80.7	84.8	82.3	74.2	79.1	85.2	101.9	128.6	178.8	162.5	112.7	1,270
2003	AFT	93.4	80.6	81.6	76.7	74.2	76.0	80.2	95.3	151.1	191.7	169.0	127.3	1,297
2002	AFT	103.7	75.0	80.8	79.6	73.6	80.2	79.0	104.1	144.0	177.7	167.2	126.8	1,292
2001	AFT	115.8	82.6	78.7	71.6	78.1	65.9	89.3	75.8	101.2	119.9	134.5	145.7	1,159
2000	AFT	99.7	79.9	82.0	79.5	75.8	83.3	91.0	101.5	145.4	166.5	170.4	129.7	1,305
sum		704.5	555.6	571.5	541.2	550.2	523.4	571.7	667.3	882.1	1,157.9	1,141.7	935.0	8,802
average		100.6	79.4	81.6	77.3	78.6	74.8	81.7	95.3	126.0	165.4	163.1	133.6	1,257
percent of year		8.0%	6.3%	6.5%	6.1%	6.3%	5.9%	6.5%	7.6%	10.0%	13.2%	13.0%	10.6%	100%
ratio		0.61	0.48	0.49	0.47	0.48	0.45	0.49	0.58	0.76	1.00	0.99	0.81	

Sub-basin D - continued

Winston-Dillard South Umpqua River

<u>Water year</u>	<u>Unit</u>	<u>Oct</u>	<u>Nov</u>	<u>Dec</u>	<u>Jan</u>	<u>Feb</u>	<u>Mar</u>	<u>Apr</u>	<u>May</u>	<u>Jun</u>	<u>Jul</u>	<u>Aug</u>	<u>Sep</u>	<u>Total</u>
2006	AFT	62.6	54.1	55.0	57.0	53.3	57.2	57.7	78.1	92.5	124.3	114.8	85.3	892
2005	AFT	75.3	59.9	53.8	50.4	45.7	52.9	52.0	59.4	70.2	109.7	114.4	87.7	831
2004	AFT	81.7	68.0	67.7	64.7	60.3	65.2	71.6	84.2	99.4	136.9	117.6	83.3	1,001
2003	AFT	78.3	66.3	59.6	55.5	50.3	57.4	56.7	71.2	113.8	130.3	122.9	95.8	958
2002	AFT	65.0	61.4	61.0	61.1	55.8	61.9	64.3	80.4	102.0	111.6	115.8	96.4	937
2001	AFT	73.8	65.1	67.2	53.6	53.6	60.6	61.7	82.9	86.2	103.4	101.3	81.4	891
2000	AFT	69.0	54.7	56.1	53.2	49.7	55.5	57.3	66.7	98.2	112.1	107.8	80.9	861
sum		505.6	429.4	420.4	395.5	368.7	410.8	421.3	523.0	662.4	828.4	794.7	610.7	6,371
average		72.2	61.3	60.1	56.5	52.7	58.7	60.2	74.7	94.6	118.3	113.5	87.2	910
percent of year		7.9%	6.7%	6.6%	6.2%	5.8%	6.4%	6.6%	8.2%	10.4%	13.0%	12.5%	9.6%	100%
ratio		0.61	0.52	0.51	0.48	0.45	0.50	0.51	0.63	0.80	1.00	0.96	0.74	

Myrtle Creek Harrison Young Branch and its tributary springs; South Umpqua River

<u>Water year</u>	<u>Unit</u>	<u>Oct</u>	<u>Nov</u>	<u>Dec</u>	<u>Jan</u>	<u>Feb</u>	<u>Mar</u>	<u>Apr</u>	<u>May</u>	<u>Jun</u>	<u>Jul</u>	<u>Aug</u>	<u>Sep</u>	<u>Total</u>
2006	AFT	28.2	25.6	20.7	20.6	6.2	14.2	10.0	22.4	37.2	68.2	67.9	47.8	369
2005	AFT	43.1	38.9	37.4	39.7	31.7	36.7	33.3	38.6	52.3	86.0	94.9	66.2	599
2004	AFT	52.4	40.3	40.7	40.6	45.2	39.4	51.4	55.2	64.5	95.6	87.6	55.7	669
2003	AFT	35.4	29.6	26.8	29.4	28.8	30.1	29.2	37.8	64.5	103.3	82.7	62.4	560
2002	AFT	42.6	41.1	34.9	30.9	26.8	31.7	28.8	43.6	61.8	76.9	79.7	36.3	535
2001	AFT	39.8	35.7	34.5	34.2	33.4	36.8	35.0	52.8	56.8	64.3	67.7	51.1	542
2000	AFT	44.9	31.6	32.7	30.5	28.5	36.2	32.3	37.7	62.5	68.2	71.2	53.5	530
sum		286.5	242.8	227.8	225.8	200.6	225.2	220.0	288.1	399.6	562.5	551.8	373.0	3,804
average		40.9	34.7	32.5	32.3	28.7	32.2	31.4	41.2	57.1	80.4	78.8	53.3	543
percent of year		7.5%	6.4%	6.0%	5.9%	5.3%	5.9%	5.8%	7.6%	10.5%	14.8%	14.5%	9.8%	100%
ratio		0.51	0.43	0.40	0.40	0.36	0.40	0.39	0.51	0.71	1.00	0.98	0.66	

The City of Myrtle Creek uses some water from numerous springs that are tributary to Harrison Brook and from Harrison Brook, a tributary to North Myrtle Creek in sub-basin E. However, most of the City's use comes directly from the South Umpqua River.

Sub-basin D - continued

Tri City South Umpqua River

<u>Water year</u>	<u>Unit</u>	<u>Oct</u>	<u>Nov</u>	<u>Dec</u>	<u>Jan</u>	<u>Feb</u>	<u>Mar</u>	<u>Apr</u>	<u>May</u>	<u>Jun</u>	<u>Jul</u>	<u>Aug</u>	<u>Sep</u>	<u>Total</u>
2006	AFT	39.1	37.5	39.9	40.9	35.9	36.7	37.0	50.2	52.5	74.6	73.5	56.6	575
2005	AFT	42.5	39.3	42.8	37.0	33.2	38.6	33.4	36.9	48.7	73.9	78.0	55.6	560
2004	AFT	51.0	37.7	40.5	40.5	36.3	42.0	42.1	49.0	60.2	81.9	76.3	52.8	611
2003	AFT	42.5	38.5	37.6	38.0	33.5	38.2	37.4	42.8	66.0	82.5	73.4	58.2	589
2002	AFT	39.6	33.3	37.3	32.8	31.5	33.6	35.6	46.0	58.9	77.1	73.6	55.0	554
2001	AFT	50.3	50.0	51.8	53.1	48.2	52.0	47.4	55.4	59.7	69.0	61.3	51.7	650
2000	AFT	51.4	50.3	49.8	50.3	46.9	49.4	50.3	58.3	74.3	78.5	79.2	62.7	701
sum		316.4	286.6	299.8	292.6	265.5	290.5	283.3	338.5	420.4	537.6	515.3	392.7	4,239
average		45.2	40.9	42.8	41.8	37.9	41.5	40.5	48.4	60.1	76.8	73.6	56.1	606
percent of year		7.5%	6.8%	7.1%	6.9%	6.3%	6.9%	6.7%	8.0%	9.9%	12.7%	12.2%	9.3%	100%
ratio		0.59	0.53	0.56	0.54	0.49	0.54	0.53	0.63	0.78	1.00	0.96	0.73	

City of Riddle Russell Creek and Cow Creek

<u>Water year</u>	<u>Unit</u>	<u>Oct</u>	<u>Nov</u>	<u>Dec</u>	<u>Jan</u>	<u>Feb</u>	<u>Mar</u>	<u>Apr</u>	<u>May</u>	<u>Jun</u>	<u>Jul</u>	<u>Aug</u>	<u>Sep</u>	<u>Total</u>
2006	AFT	26.7	22.4	24.3	24.8	25.7	26.2	28.3	32.6	28.3	37.3	34.7	27.5	339
2005	AFT	22.2	21.7	20.9	21.4	23.7	20.9	21.4	22.8	23.7	27.6	36.7	26.5	289
2004	AFT	23.7	23.6	21.7	23.2	25.1	22.7	25.4	27.5	30.7	40.9	33.5	28.5	327
2003	AFT	19.9	20.3	18.5	21.0	17.8	22.4	19.6	23.5	30.7	41.4	32.3	29.4	297
2002	AFT	24.5	18.5	21.2	20.3	22.8	21.3	20.5	20.1	24.8	38.2	34.6	23.6	290
2001	AFT	25.4	24.2	24.3	25.3	22.5	25.7	23.6	31.6	30.8	32.8	29.5	27.4	323
2000	AFT	28.4	24.7	34.9	31.8	29.4	23.0	29.3	27.3	41.5	46.4	45.6	36.4	399
sum		170.7	155.3	165.7	167.9	167.1	162.2	168.1	185.3	210.5	264.6	246.9	199.3	2,264
average		24.4	22.2	23.7	24.0	23.9	23.2	24.0	26.5	30.1	37.8	35.3	28.5	323
percent of year		7.5%	6.9%	7.3%	7.4%	7.4%	7.2%	7.4%	8.2%	9.3%	11.7%	10.9%	8.8%	100%
ratio		0.65	0.59	0.63	0.63	0.63	0.61	0.64	0.70	0.80	1.00	0.93	0.75	

Sub-basin D - continued

South Umpqua Water Association Cow Creek

<u>Water year</u>	<u>Unit</u>	<u>Oct</u>	<u>Nov</u>	<u>Dec</u>	<u>Jan</u>	<u>Feb</u>	<u>Mar</u>	<u>Apr</u>	<u>May</u>	<u>Jun</u>	<u>Jul</u>	<u>Aug</u>	<u>Sep</u>	<u>Total</u>
2006	AFT	4.6	5.4	3.8	4.9	3.7	5.1	4.2	5.6	4.7	7.9	9.6	7.2	67
2005	AFT	4.5	4.3	4.0	4.1	4.4	4.0	3.8	4.8	4.6	7.1	9.4	6.1	61
2004	AFT	4.6	3.9	4.8	4.5	3.9	4.6	4.1	4.7	6	7.4	11.7	4.3	65
2003	AFT	4.7	4.4	3.6	4.1	3.9	3.3	4.2	3.8	5.9	8.6	7.4	7.2	61
2002	AFT	4.9	4.0	4.2	4.7	4.1	3.6	4.3	5.3	8.5	5.5	7.1	6.4	63
2001	AFT	4.9	4.0	4.4	4.5	4.8	4.0	5.0	5.2	6.6	6.5	7.3	6.4	64
2000	AFT	5.4	4.6	4.7	5.3	4.8	4.0	5.1	4.4	6.5	6.9	8.8	6.2	67
sum		33.7	30.8	29.5	32.2	29.5	28.7	30.7	33.8	42.9	49.8	61.3	43.7	447
average		4.8	4.4	4.2	4.6	4.2	4.1	4.4	4.8	6.1	7.1	8.8	6.2	64
percent of year		7.5%	6.9%	6.6%	7.2%	6.6%	6.4%	6.9%	7.6%	9.6%	11.1%	13.7%	9.8%	100%
ratio		0.55	0.50	0.48	0.52	0.48	0.47	0.50	0.55	0.70	0.81	1.00	0.71	

City of Glendale Section Creek; Cow Creek; Stranns Spring; Mill Creek; Mill Creek Reservoir
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<u>Water year</u>	<u>Unit</u>	<u>Oct</u>	<u>Nov</u>	<u>Dec</u>	<u>Jan</u>	<u>Feb</u>	<u>Mar</u>	<u>Apr</u>	<u>May</u>	<u>Jun</u>	<u>Jul</u>	<u>Aug</u>	<u>Sep</u>	<u>Total</u>
2006	AFT	11.3	10.1	11.2	20.0	18.4	22.0	22.0	25.0	22.3	23.1	21.9	15.7	223
2005	AFT	18.7	16.2	15.4	17.7	16.4	19.2	16.8	13.9	15.4	22.7	23.8	21.8	218
2004	AFT	18.7	16.2	15.4	17.7	14.5	13.4	12.5	13.6	16.7	19.9	19.4	17.0	195
2003	AFT	13.4	14.2	15.1	12.3	11.4	11.5	12.3	15.3	18.4	18.4	16.9	15.6	175
2002	AFT	12.2	11.7	11.8	12.8	11.4	13.3	12.3	15.9	17.9	18.9	17.1	14.7	170
2001	AFT	19.9	16.2	15.9	15.6	13.3	12.7	12.7	16.0	17.2	19.0	18.7	16.1	193
2000	AFT	19.2	17.3	20.3	20.8	21.4	20.7	18.8	19.0	23.1	27.9	22.0	21.1	251
sum		113.2	101.9	104.9	117.0	106.8	112.9	107.4	118.6	130.9	149.9	139.8	121.9	1,425
average		16.2	14.6	15.0	16.7	15.3	16.1	15.3	16.9	18.7	21.4	20.0	17.4	204
percent of year		7.9%	7.2%	7.4%	8.2%	7.5%	7.9%	7.5%	8.3%	9.2%	10.5%	9.8%	8.6%	100%
ratio		0.76	0.68	0.70	0.78	0.71	0.75	0.72	0.79	0.87	1.00	0.93	0.81	

Sub-basin E

City of Canyonville Canyon Creek

<u>Water year</u>	<u>Unit</u>	<u>Oct</u>	<u>Nov</u>	<u>Dec</u>	<u>Jan</u>	<u>Feb</u>	<u>Mar</u>	<u>Apr</u>	<u>May</u>	<u>Jun</u>	<u>Jul</u>	<u>Aug</u>	<u>Sep</u>	<u>Total</u>
2006	AFT	35.5	33.2	29.5	40.2	36.5	35.7	37.3	53.1	55.4	70.1	65.2	54.8	547
2005	AFT	38.3	32.3	30.9	33.4	31.8	32.1	35.4	37.5	45.2	62.9	67.4	44.7	492
2004	AFT	38.4	31.9	30.4	34.0	32.5	33.9	36.1	39.3	44.9	64.3	58.1	43.5	487
2003	AFT	33.7	28.3	30.4	32.3	27.7	30.3	32.7	34.9	50.9	63.8	53.7	42.8	462
2002	AFT	31.3	31.8	31.4	27.6	24.3	30.1	31.8	33.3	43.6	56.8	56.0	44.7	443
2001	AFT	30.7	28.6	29.3	28.9	27.0	30.3	30.9	36.8	41.0	42.8	49.8	38.1	414
2000	AFT	34.6	31.0	28.9	27.4	28.2	29.0	28.5	34.8	40.6	46.0	47.3	38.4	415
sum		242.4	217.0	210.9	223.7	208.1	221.4	232.8	269.7	321.7	406.7	397.5	307.1	3,259
average		34.6	31.0	30.1	32.0	29.7	31.6	33.3	38.5	46.0	58.1	56.8	43.9	466
percent of year		7.4%	6.7%	6.5%	6.9%	6.4%	6.8%	7.1%	8.3%	9.9%	12.5%	12.2%	9.4%	100%
ratio		0.60	0.53	0.52	0.55	0.51	0.54	0.57	0.66	0.79	1.00	0.98	0.75	

Analysis of Water Use and Supply

An analysis of water use, future anticipated water needs, and reliability of supply has been completed for each of these water districts. The goal of the analyses is to help estimate long-term requirements for water for each area of the County. The analyses include consideration of current use, future use based on population increases, and the reliability of the water district's existing water rights.

The past and present estimated population served by each water district is based on the 2000 U.S. Census data of people per household for each community served, and the number of services provided by the district in a given year. The number of people per household (service) varies between 2.04 in Elkton to 2.75 in Glendale, with a County average of 2.48.

Current Per-Capita Rate

The average annual raw water diversion is broken into average monthly use (annual divided by 12), and average daily use (monthly divided by 30). This average daily use is then divided by the allocated population of the district to give the average per capita use in gallons-per-capita-per-day (GPCD). Table 1.A-4 lists the per capita water use rates for each of the water districts analyzed. These values vary across the County from 76 GPCD in the South Umpqua Water Association that serves the area around Riddle, and 294 GPCD in the City of Canyonville. The variation reflects a number of likely factors including the following:

- inaccuracies in the allocated population;
- leakage in the distribution systems;
- the amount of industrial or other uses being supplied by the system; and
- the amount of supplemental water from private wells or private water rights also providing water to these customers.

Sub-basin	Water district	Current average GPCD ¹	Current peak GPCD ¹
Coastal / Lower Umpqua River	City of Reedsport	164	295
Umpqua River / North Umpqua River	City of Elkton	200	360
	Glide Water Association	120	215
	City of Roseburg	223	467
	Umpqua Basin Water Association	163	294
Elk Creek / Calapooya Creek	City of Drain	145	261
	City of Oakland	179	321
	City of Yoncalla	135	242
	City of Sutherlin	251	453
South Umpqua / Cow Creek	Roberts Creek Water District	148	310
	Winston-Dillard Water District	139	291
	City of Myrtle Creek	147	309
	Tri City Water District	137	283
	City of Riddle	182	381
	South Umpqua Water Association	76	157
	City of Glendale	190	394
South Umpqua Tributaries	City of Canyonville	294	618
Douglas County average (all water districts)²		186	372

¹ GPCD = gallons per capita day.
² Based on a weighted average by population served.

Table 1.A-4: Current per capita water use by major water districts within each sub-basin.

Current peak use is also listed. The annual average for all Douglas County residents that receive water service is 186 GPCD for comparison. The average peak use for all water service customers is 372 GPCD.

Future Per-Capita Rate

Two estimates of future per capita use rates are presented. The first (Estimate A) is determined by increasing per capita rates based on historic data by community type, while the second (Estimate B) is based on each districts' average daily use rate. These two methods are explained in the following:

Estimate A

Water use not only increases with an expanding population but also per individual. Historic per-capita water use rates have shown gradual increases over time. Therefore a projected increase in per-capita rate is also assumed. The 1989 Water Resources Management Program derived future per-capita rates based on data in Appendix XI, Municipal and Industrial Water Supply, Columbia North Pacific Framework Plan, 1971, by the Pacific Northwest River Basins Commissions. For areas such as the Umpqua, Rogue, and other Oregon coastal drainages, projected rates are shown in the 1971 publication and summarized in Table 1.A-5.

Community population range	Design year needs (GPCD)		
	1980	2000	2020
under 10,000	180	200	215
10,000 – 20,000	170	190	205
over 20,000	195	215	230
all sizes	185	205	220
Source: Douglas County 1989 Water Resources Management Plan (referencing information from Municipal and Industrial Water Supply, Columbia North Pacific Framework Plan, Appendix XI, 1971).			

Table 1.A-5: Per-capita water use projections by community size.

Based on these calculations, a rate for Douglas County in the year 2030 of between 205 and 230 GPCD was selected for use in the 1989 WRMP. A comparison of current actual per-capita use in each district with data in Table 1.A-5 (year 2000) shows that projections for most communities were very high. Five water districts (Elkton, Roseburg, Oakland, Riddle, and Glendale) have current use that is close to the projections and three (Reedsport, Sutherlin, and Canyonville) have current use that far exceeds the predictions. Since this plan projects use to the year 2050 and the vast majority of districts currently use far less than the projections, the range of 205 to 230 GPCD will continue to be used for projections to 2050.

Monthly water needs fluctuate around the average for the year with peak use needs occurring in July or August. During the peak month, a monthly average of about 1.4 times the annual average, or 287 to 322 GPCD is expected to be required.

The calculation of peak month value above is derived from projections that do not account for the introduction of a cost of raw or untreated water. Future water needs in Douglas County, particularly in the May through October period, will be provided from sources other than unregulated streamflows. If furnished from stored water, the cost of the storage facility will likely be repaid by a charge for the water used and will be reflected in individual water bills. Such increases will tend to cause a decrease in use and the total effect is assumed to result in a reduction of 10 percent in the peak rate. The summer or peak use projection then becomes between 258 and 290 GPCD.

To meet these needs, water will be released from a reservoir and will flow down a stream channel to a point of diversion. During the time the released water is in-stream, evaporation and other losses will occur. Thus for reservoir sizing studies, the higher value of 290 GPCD should be used as the summer peak month demand.

Estimate B

Another method of estimating future per capita use rates relates to each district's average daily use rate. Future use and evaluation of water right reliability is based on an estimate of peak daily use. Peak daily use is generally expressed as a ratio to average daily use, with a factor of 1.8 being commonly used. A study was prepared for the City of Roseburg in 1984 including preliminary sizing of a replacement water treatment plant. A factor of 2.1 was developed in that report. The lower factor of 1.8 is used to calculate peak daily use for all areas of the County except the Roseburg area and those areas in the South Umpqua sub-basin, where the higher factor of 2.1 is used. Peak daily use is a product of this factor multiplied by each water district's average daily use.

For comparative purposes, average maximum daily use is also calculated from the "Average Maximum Month" divided by 30. This daily average is generally expected to be less than the peak daily calculated above, since averaging days in a month will lessen the peaks. This is the case in all districts except Elkton and Sutherlin where they are equal. From the peak daily, a per capita use is calculated based on the average population that the district served during that time.

The product of this peak daily per capita use and the projected population to 2030 and 2050 is one estimate of future peak rate and daily use. Again for comparative purposes, an alternate peak rate of daily use is calculated using 290 GPCD based on the discussion in Estimate A.

Future Water Needs

The larger of the peak day per capita rate is selected for assessing future water supplies. The estimated future monthly rates are distributed in the same pattern as derived from current monthly use, using the ratio of average monthly use to peak average monthly use. The future need is calculated for the year 2050 and shown in the row labeled "Future Need (2050)."

For each district, water rights data including priority date and maximum diversion rate were obtained from the State Water Resource Department. The maximum diversion rates

are listed by month. When a district has a water right that is junior to minimum instream flows, and thus subject to restrictions during low flow months, maximum diversion rates are adjusted. In cases where the future needs exceed the diversion amount allowed by existing water rights in any given month, a deficit is listed. Evaluations of each major water district in the County are discussed in the following section by sub-basin.

Water District Analyses

Coastal Sub-basin (A)

Reedsport

The City of Reedsport water system provides water service to Reedsport and to the unincorporated areas of Gardiner and Winchester Bay.³ The estimated population of the water district in 2006 is 5,543 people.⁴ Following the 1999 closure of the International Paper mill in Gardiner, the population of the area declined. In the City of Reedsport, the population dropped by nearly nine percent between 1990 and 2000. However, the population in the area has been fairly stable since 2002.

Average water use for Reedsport is calculated for water years 2002 through 2006 only. The Reedsport water system has been primarily a gravity-fed design that fills the reservoirs without automation. Prior to 2002, the system allowed the reservoirs to overflow at a fairly constant rate. This made Reedsport's demand for water very high, and their per capita use rate appear much higher than actual use. The current system still has some overflow at night but its efficiency has improved substantially. Therefore it is misleading to incorporate water years 2000 and 2001 in determining demand for water now and into the future, as those years create an artificial high demand for water that no longer exists.

Average water use totals about 415 million gallons per year (MGY), resulting in a per capita average daily use of 205 GPCD. According to the City of Reedsport Water Facilities Plan, an estimated 20 percent of this water use is due to leakage and unmetered activities such as fire fighting (Kennedy/Jenks Consultants 2006). Therefore the average actual water use excluding these factors would be 164 GPCD for 2005 and 2006. The peak per capita daily use is estimated at 295 GPCD including a deduction for the estimated 20 percent loss of water.

The future peak diversion rate to serve the estimated 2050 population of 9,689 people is 2,482 GPM during the month of July. The City of Reedsport holds exclusive water rights to Clear Lake and Lake Edna reservoirs. The City's rights allow for a maximum diversion rate of 11,879 GPM and predate establishment of minimum flows. The City's rights are adequate to provide for future population growth. It is important to note that 7,091 GPM of the total 11,879 GPM water rights for the City are designated for both municipal and industrial manufacturing use. The amounts designated for each are not specified. Therefore, although a large surplus is shown here, some of that water will be needed for industrial use as well as municipal.

³ In water year 2006, about 80 percent of the users were in Reedsport, 14 percent in Winchester Bay and 6 percent in Gardiner.

⁴ The 2006 population is based on the City's estimate of the population served in 2005 in the City of Reedsport Water Facilities Plan Amendment, 2006 (Kennedy/Jenks 2006) and one year of average annual growth at 1.7 percent.

Name: City of Reedsport		System Serves:		Reedsport, Gardiner, and Winchester Bay		Services in 2006 =		1,910					
Populations:		<u>2006</u>	<u>2030</u>	<u>2050</u>	Annual Avg Growth Rate:		1.7%		Average svcs =	1,908			
(water district)		5,543	7,804	9,689	(based on Douglas Cty Comprehensive Plan)				Average pop =	5,536			
										(2005 to 2006)			
People/Svc =		2.90 (calculated from number of services and population served in 2006)											
Average Annual Use 2002-2006:		415.41		MGY		Average Max. Month:		52.5		MG			
Average Monthly Use:		34.62		MG		Average Max. Daily: (Max Month/30):		1.75		MGD			
Average Daily Use:		1.15		MGD		Peak Day (Avg Daily Use* 1.8):		2.08		MGD 1,442 GPM			
*Average Daily GPCD (gross):		205		GPCD		***Peak GPCD (gross):		369		GPCD			
Average Daily GPCD (net):		164		GPCD		*Peak GPCD (net- less 20% for leaks):		295		GPCD			
(* average GPCD based on water years 2005 and 2006 only)		(*** peak GPCD based on water years 2005 and 2006 only)											
(** assumes 20% loss to leakage and unmetered activities)													
Water Rights:				Projected Water Use:		<u>2030</u>		<u>2050</u>					
Priority	GPM	Source Stream		Peak Day (GPCD) at		290	1,572 GPM	1,951 GPM					
1912	6,733	Clear Lake Reservoir		Peak Day (GPCD) at		369	1,999 GPM	2,482 GPM					
1912	358	Ten Springs trib to Umpqua R		(highest) Use:			1,999 GPM	2,482 GPM					
1935	4,488	Clear and Edna Lakes Reservoirs											
1980	300	groundwater from 3 wells											
Total	11,879												
Current Average Use													
	<u>Oct</u>	<u>Nov</u>	<u>Dec</u>	<u>Jan</u>	<u>Feb</u>	<u>Mar</u>	<u>Apr</u>	<u>May</u>	<u>Jun</u>	<u>Jul</u>	<u>Aug</u>	<u>Sep</u>	<u>Total</u>
(MG)	38.6	32.4	31.0	34.6	28.4	31.0	30.1	36.3	40.3	63.9	55.6	43.6	465.8
(GPM)	865	750	694	775	705	694	697	813	932	1,432	1,247	1,009	
Ratio	0.6	0.5	0.5	0.5	0.4	0.5	0.5	0.6	0.6	1.0	0.9	0.7	
Future Need (2050)													
(GPM)	1,500	1,259	1,203	1,344	1,103	1,204	1,169	1,410	1,564	2,482	2,161	1,693	
Current Rights													
(GPM)	11,879	11,879	11,879	11,879	11,879	11,879	11,879	11,879	11,879	11,879	11,879	11,879	
Deficit (#) or Surplus in 2050													
(GPM)	10,379	10,620	10,676	10,535	10,776	10,675	10,709	10,469	10,315	9,397	9,717	10,186	
(AFT/ month)	1,422	1,408	1,463	1,443	1,333	1,462	1,420	1,434	1,368	1,287	1,331	1,350	
MG = million gallons MGY = million gallons per year MGD = million gallons per day GPCD = gallons per capita day GPM = gallons per minute AFT = acre-feet													

Umpqua River / North Umpqua River Sub-basins (B)

Elkton

The City of Elkton water system provides water service to an estimated population of 218 people in 2006, with about 2.04 people per service. Average water use totals 15.5 million gallons per year (MGY) resulting in a per capita average daily use of 200 GPCD. The peak per capita daily use is estimated at 360 GPCD.

The future peak diversion rate to serve the estimated 2050 population of 410 people is 103 GPM during the month of July. The City's rights allow for a maximum diversion rate of 224 GPM from the Umpqua River and 224 GPM from two springs tributary to the Umpqua River. Both rights predate establishment of most of the minimum flows. A minimum instream flow of 525 cfs on the North Umpqua River from Little River to the confluence with the Umpqua River predates the City's 1971 right. However, mean flow of the North Umpqua River in July should be more than adequate to meet the instream minimum and meet the City of Elkton's needs. In addition, the City has adequate rights using only the 1949 water right to meet projected future needs.

Name: City of Elkton		System Serves: Elkton		Services in 2006 = 107									
				Average svcs = 106									
Populations: <u>2006</u> <u>2030</u> <u>2050</u>		Annual Avg Growth Rate: 2.00%		Average population = 216									
(water district) 218 323 410		<i>(based on Douglas Cty Comprehensive Plan)</i>		(2000 to 2006)									
People/Svc = 2.04 <i>(based on census 2000)</i>													
Average Annual Use, 2000-2006:		15.53	MGY	Average Max. Month: 2.3 MG									
Average Monthly Use:		1.29	MG	Average Max. Daily: (Max Month/30): 0.08 MGD									
Average Daily Use:		0.04	MGD	Peak Day (Avg Daily Use* 1.8): 0.08 MGD 53.91 GPM									
Average Daily GPCD:		200	GPCD	Peak GPCD (Peak daily/population): 360 GPCD									
<u>Water Rights:</u>			<u>Projected Water Use:</u>										
Priority	GPM	Source Stream	Peak Day (GPCD) at	2030	2050								
1949	224	2 springs tributary to Umpqua	Peak Day (GPCD) at	65 GPM	83 GPM								
1971	224	Umpqua River	(highest) Use:	81 GPM	103 GPM								
Total	448			81 GPM	103 GPM								
Current Average Use													
	<u>Oct</u>	<u>Nov</u>	<u>Dec</u>	<u>Jan</u>	<u>Feb</u>	<u>Mar</u>	<u>Apr</u>	<u>May</u>	<u>Jun</u>	<u>Jul</u>	<u>Aug</u>	<u>Sep</u>	<u>Total</u>
(MG)	1.1	1.0	1.1	1.0	0.9	1.0	0.9	1.2	1.5	2.3	2.1	1.4	15.5
(GPM)	26	23	24	23	22	22	21	26	35	51	48	33	
Ratio	0.5	0.4	0.5	0.4	0.4	0.4	0.4	0.5	0.7	1.0	0.9	0.6	
Future Need (2050)													
(GPM)	52	45	49	46	39	45	40	53	68	103	96	65	
Current Rights													
(GPM)	448	448	448	448	448	448	448	448	448	448	448	448	
Deficit (#) or Surplus in 2050													
(GPM)	397	404	399	402	409	404	408	396	380	346	352	384	
(AFT/ month)	54	54	55	55	51	55	54	54	50	47	48	51	
<i>MG = million gallons MGY = million gallons per year MGD = million gallons per day GPCD = gallons per capita day GPM = gallons per minute AFT = acre-feet</i>													

Table 1.A-7: Elkton current water use and future use projections.

Glide Water Association

The Glide Water Association provides water to the community of Glide through a diversion on the North Umpqua River. The average annual population served by the association for water years 2000-2006 was 1,262 and the current 2006 population is 1,382. There are 2.71 people per water service. Average water use totals 54.3 MGY resulting in an average per capita daily use of 120 GPCD. The peak per capita daily use is estimated at 215 GPCD.

The future peak diversion rate to serve the estimated 2050 population of 2,294 is 462 GPM during the month of July. The Glide Water Association's water rights permit a total maximum diversion rate of 988 GPM from the North Umpqua River. All of these rights are senior to the 1974 and 1991 minimum instream flows. The Association's rights are adequate to provide for projected future growth.

Name: Glide Water Association			System Serves: Glide and surrounding areas		Services in 2006 = 510								
					Average svcs = 466								
Populations: <u>2006</u> <u>2030</u> <u>2050</u>			Annual Avg Growth Rate: 1.50%		Average population 1,262								
1,382 1,880 2,294			(based on average County growth from the Douglas County Comprehensive Plan)		Average population (2000 to 2006)								
People/Svc = 2.71 (based on census 2000)													
Average Annual Use, 2000-2006: 54.29 MGY			Average Max. Month: 6.5 MG										
Average Monthly Use: 4.52 MG			Average Max. Daily: (Max Month/30): 0.22 MGD										
Average Daily Use: 0.15 MGD			Peak Day (Avg Daily Use* 1.8): 0.27 MGD		188.52 GPM								
Average Daily GPCD: 120 GPCD			Peak GPCD (Peak daily/population): 215 GPCD										
<u>Water Rights:</u>			<u>Projected Water Use:</u>		<u>2030</u>								
Priority	GPM	Source Stream			<u>2050</u>								
1961	90	North Umpqua	Peak Day (GPCD) 290	379 GPM	462 GPM								
1970	224	North Umpqua	Peak Day (GPCD) 215	281 GPM	343 GPM								
1974	673	North Umpqua	(highest) Use:	379 GPM	462 GPM								
Total	988												
Current Average Use													
	<u>Oct</u>	<u>Nov</u>	<u>Dec</u>	<u>Jan</u>	<u>Feb</u>	<u>Mar</u>	<u>Apr</u>	<u>May</u>	<u>Jun</u>	<u>Jul</u>	<u>Aug</u>	<u>Sep</u>	<u>Total</u>
(MG)	4.3	3.7	4.0	3.8	3.4	3.8	3.9	4.5	5.2	6.5	6.3	4.9	54.3
(GPM)	97	86	90	85	84	84	90	101	121	145	140	114	
Ratio	0.7	0.6	0.6	0.6	0.5	0.6	0.6	0.7	0.8	1.0	1.0	0.8	
Future Need (2050)													
(GPM)	311	267	287	273	241	269	278	321	372	462	447	353	
Current Rights													
(GPM)	988	988	988	988	988	988	988	988	988	988	988	988	
Deficit (#) or Surplus in 2050													
(GPM)	677	721	701	715	746	719	710	666	615	526	541	635	
(AFT/ month)	93	96	96	98	92	98	94	91	82	72	74	84	
MG = million gallons MGY = million gallons per year MGD = million gallons per day GPCD = gallons per capita day GPM = gallons per minute AFT = acre-feet													

Table 1.A-8: Glide current water use and future water use projections.

Roseburg

The City of Roseburg water system provides treated water to much of the urban population of the County. The population served includes residents within the Roseburg urban growth boundary and outlying areas, and treated water is delivered to the Dixonville Water Association for further distribution in that area. As of May 2007, this arrangement was dissolved and Roseburg now provides services directly to those customers that were previously served by the Dixonville Water Association.

The 2006 estimated population of the service area including those served by the Dixonville Water Association is 24,397 using and estimate of 2.32 people per water service. Average annual water use from 2000 to 2006 is 1,872 MGY and the average per capita daily use is 223 GPCD. The peak per capita daily use is estimated at 467 GPCD.⁵

The future population served by the City in 2050 is expected to be 51,234 people. At a peak per capita need of 467 GPCD, the future peak diversion rate required is 16,627 GPM during July and close to that for August. The City has water rights allowing diversion of 11,221 GPM from the North Umpqua River with priority dates senior to all minimum instream flows.⁶ The City has a further right of 2,693 GPM from the North Umpqua River with a priority date of 1979.⁷ The total allowable diversion rate is 13,914 GPM.

Projected diversion rates will exceed allowable diversion rates during July and August. The total annual deficit is estimated to be 702 acre-feet per year. In addition, the 1979 water rights totaling 2,693 GPM that are junior to the 1974 instream flows are not reliable for future water supply in August and September due to insufficient flows in the North Umpqua River to support all needs including instream requirements. Consequently, in years when flow is insufficient to meet both instream rights and municipal demand, the annual deficit may go up to 1,187 acre-feet per year, with water shortages also occurring in September as well as July and August.⁸ The North Umpqua River has been regulated once in the last nine years causing this 1979 water right to be unreliable in mid- to late August through October.

In January, 2007, the City of Roseburg completed a *draft* Long-Range Water Supply Plan. The plan assesses the current reliability of water rights and potential for acquiring additional rights on the North Umpqua River. Reliable water rights of interest to the City to meet municipal demand need to have priority dates prior to the 1974 instream water rights. Several companies and individuals who hold such rights have been contacted to determine interest in assessing selling all or part of their rights to the City. No final determination of how to meet the future water needs has yet been completed.

⁵ Average and peak per capita daily rates are calculated for water years 2003 - 2006 only, since data on the population served prior to 2003 was not available.

⁶ The City's 1950 water right is held in the name of the Oregon Water Corp. and is designated for the City of Roseburg's municipal and domestic use.

⁷ The City of Roseburg also has a 1977 water right for 1,347 GPM that is designated as supplemental municipal water use to be used by Roberts Creek and Winston-Dillard water districts when the South Umpqua River is insufficient to meet their needs. That right is shown in the calculations for those districts.

⁸ Calculated using 11,221 GPM of current rights in the low flow months of August and September (excludes those rights junior to the 1974 instream rights).

Name: City of Roseburg		System Serves: Roseburg area		Services in 2006 = 10,516									
Populations:	<u>2006</u>	<u>2030</u>	<u>2050</u>	Annual Avg Growth Rate: 2.5%	Average svcs = 10,343								
(water district)	24,397	39,035	51,234	(based on Douglas County Comprehensive Plan)	Average population : 23,995								
(2000 to 2006)													
People/Svc = 2.32 (based on Census 2000)													
Average Annual Use, 2000-2006:		1,872.3	MGY	Average Max. Month: 259.6 MG									
Average Monthly Use:		156.03	MG	Average Max. Daily: (Max Month/30): 8.65 MGD									
Average Daily Use:		5.20	MGD	Peak Day (Avg Daily Use* 2.1): 10.92 MGD 7,584.73 GPM									
Average Daily GPCD:		223	GPCD	<i>From 1984 Roseburg Treatment Plant Study:</i>									
<i>(**average daily GPCD based on water years 2003-2006 only)</i>													
				<i>Peak Day = 2.1 * Avg Day</i>									
				**Peak GPCD (peak day/avg population): 467 GPCD									
<i>(**peak daily GPCD based on water years 2003-2006 only)</i>													
Water Rights:		Projected Water Use:		2030	2050								
Priority	GPM	Source Stream	Peak Day (GPCD) ± 290	7,861 GPM	10,318 GPM								
1950	5,386	North Umpqua	Peak Day (GPCD) ± 467	12,668 GPM	16,627 GPM								
1957	5,835	North Umpqua	(highest) Use:	12,668 GPM	16,627 GPM								
1979	2,693	North Umpqua											
Total	13,914												
	<u>Oct</u>	<u>Nov</u>	<u>Dec</u>	<u>Jan</u>	<u>Feb</u>	<u>Mar</u>	<u>Apr</u>	<u>May</u>	<u>Jun</u>	<u>Jul</u>	<u>Aug</u>	<u>Sep</u>	<u>Total</u>
Current Average Use													
(MG)	142.3	111.2	114.1	114.0	103.5	115.2	117.0	154.1	197.5	259.6	254.9	188.8	1,872.3
(GPM)	3,189	2,575	2,555	2,554	2,567	2,580	2,708	3,452	4,573	5,816	5,711	4,371	
Ratio	0.5	0.4	0.4	0.4	0.4	0.4	0.5	0.6	0.8	1.0	1.0	0.7	
Future Need (2050)													
(GPM)	9,116	7,124	7,305	7,301	6,630	7,377	7,492	9,869	12,651	16,627	16,327	12,093	
Current Rights													
(GPM)	13,914	13,914	13,914	13,914	13,914	13,914	13,914	13,914	13,914	13,914	13,914	13,914	
Deficit (#) or Surplus in 2050													Total
(GPM)	4,798	6,790	6,609	6,613	7,284	6,537	6,422	4,045	1,263	(2,713)	(2,413)	1,821	<u>Deficit</u> (5,126)
(AFT/ month)	657	900	905	906	901	896	851	554	167	(372)	(331)	241	(702)
Deficit or surplus in 2050 when low streamflows preclude use of 1979 water rights													
(GPM)	4,798	6,790	6,609	6,613	7,284	6,537	6,422	4,045	1,263	(2,713)	(5,106)	(872)	(8,691)
(AFT/ month)	657	900	905	906	901	896	851	554	167	(372)	(700)	(116)	(1,187)
MG = million gallons MGY = million gallons per year MGD = million gallons per day GPCD = gallons per capita day GPM = gallons per minute AFT = acre-feet													

Table 1.A-9: Roseburg current water use and future water use projections.

Umpqua Basin Water Association (UBWA)

The Umpqua Basin Water Association has a service area covering 100 square miles, one of the largest service areas of any provider in the County, and perhaps the State. From the diversion on the North Umpqua River near Brown's Bridge, the service area includes areas west of Roseburg from the outskirts of Green to Wilbur including the communities of Garden Valley, Melrose, Lookingglass, and Happy Valley. The 2006 population served is estimated to be 7,212 people, based on an average per service of 2.31 people. The average daily per capita need is 163 GPCD. Future peak per capita need is estimated at 294 GPCD by the year 2050 resulting in a peak future diversion need of 3,088 GPM in July and close to that in August.

The Association has water rights from the North Umpqua River amounting to 4,084 GPM. Over half of that right (2,244 GPM) has a priority date of 1978 and is junior to the 1974 instream rights on the North Umpqua River. In total the rights are adequate to provide for estimated future needs. However, streamflows in the North Umpqua are close to being entirely committed during September. Therefore the reliability of the supply is questionable during the low flow and high use months of August and September. If flows are inadequate during August and September, the UBWA will not have an adequate supply to meet expected needs in 2050. The projected deficit would be 213 acre-feet.

Name: UBWA		System Serves:		areas west of Roseburg from outskirts of Green to Wilbur		Services in 2006 =		3,122					
Populations:		<u>2006</u>	<u>2030</u>	<u>2050</u>	Annual Avg Growth Rate: 2.5%		Average svcs =		2,895				
(water district)		7,212	11,539	15,145	(based on Douglas County Comprehensive Plan)		Average population =		6,688				
People/Svc =		2.31 (based on census 2000)											
Average Annual Use, 2000-2006:		392.70	MGY	Average Max. Month:		51.9 MG							
Average Monthly Use:		32.72	MG	Average Max. Daily: (Max Month/30):		1.73 MGD							
Average Daily Use:		1.09	MGD	Peak Day (Avg Daily Use* 1.8):		1.96 MGD		1,363.5 GPM					
Average Daily GPCD:		163	GPCD	Peak GPCD (Peak daily/Avg population):		294 GPCD							
<u>Water Rights:</u>			<u>Projected Water Use:</u>			<u>2030</u>	<u>2050</u>						
Priority	GPM	Source Stream	Peak Day (GPCD) at		290	2,324 GPM	3,050 GPM						
1966	1,391	North Umpqua	Peak Day (GPCD) at		294	2,353 GPM	3,088 GPM						
1971	449	North Umpqua	(highest) Use:		2,353 GPM	3,088 GPM							
1978	2,244	North Umpqua											
Total	4,084												
	<u>Oct</u>	<u>Nov</u>	<u>Dec</u>	<u>Jan</u>	<u>Feb</u>	<u>Mar</u>	<u>Apr</u>	<u>May</u>	<u>Jun</u>	<u>Jul</u>	<u>Aug</u>	<u>Sep</u>	<u>Total</u>
Current Average Use													
(MG)	28.6	24.9	25.9	25.8	22.7	25.4	25.9	33.0	40.5	51.9	49.9	38.3	392.7
(GPM)	641	576	580	578	563	568	599	740	937	1,163	1,117	887	
Ratio	0.6	0.5	0.5	0.5	0.4	0.5	0.5	0.6	0.8	1.0	1.0	0.7	
Future Need (2050)													
(GPM)	1,701	1,480	1,539	1,536	1,350	1,509	1,539	1,964	2,407	3,088	2,967	2,279	
Current Rights													
(GPM)	4,084	4,084	4,084	4,084	4,084	4,084	4,084	4,084	4,084	4,084	4,084	4,084	
Deficit (#) or Surplus in 2050													
(GPM)	2,383	2,604	2,545	2,548	2,734	2,575	2,545	2,120	1,677	997	1,117	1,805	
(AFT/ month)	327	345	349	349	338	353	337	290	222	137	153	239	
Deficit (#) or Surplus in 2050 when low streamflows preclude use of the 1978 water right													
(GPM)	2,383	2,604	2,545	2,548	2,734	2,575	2,545	2,120	1,677	997	(1,127)	(439)	Total deficit (1,566)
(AFT/ month)	327	345	349	349	338	353	337	290	222	137	(154)	(58)	(213)
MG = million gallons MGY = million gallons per year MGD = million gallons per day GPCD = gallons per capita day GPM = gallons per minute AFT = acre-feet													

Table 1.A-10: Umpqua Basin Water Association current water use and future water use projections.

Elk Creek / Calapooya Creek Sub-basins (C)*Drain*

The City of Drain water system serves an estimated 2006 population of 1,617 people based on an average of 2.57 people per service. Average annual water use totals 99 MGY. The average daily per capita need is 145 GPCD. This average per capita rate is somewhat low due in part to the estimated higher number of people per service. This figure may be somewhat low, leading to a future peak per capita need in 2050 estimated at 261 GPCD; somewhat less than the comparison of 290 GPCD. Based on the higher peak estimate of 290 GPCD, the peak total future diversion need is 469 GPM in July.

The City has water rights of 898 GPM with a priority date of 1909 and another 898 GPM with a priority date of 1912. Both rights are on Bear Creek and provide the City with a total of 1,796 GPM.⁹ The current rights are adequate to provide for estimated future needs. However, flows on Bear Creek are often low and may not fulfill the entire water right. To offset this shortage, the City has a 1971 right for storage and use of up to 1,000 acre-feet in Bear Creek Reservoir located on Bear Creek. This reserve may be used at a maximum rate of 2,244 GPM and provide adequate water when Bear Creek flow is insufficient.

⁹ These water rights designated for the City of Drain are held in the name of the Drain Water Company.

Name: Drain		System Serves: Drain		Services in 2006 = 629									
Populations: 2006 2030 2050		Annual Avg Growth Rate: 1.0%		Average svcs = 615									
(water district) 1,617 2,004 2,328		(based on Douglas County Comprehensive Plan)		Average population = 1,581									
				(2004 to 2006)									
People/Svc = 2.57 (based on census 2000)													
Average Annual Use, 2000-2006:		99.00	MGY	Average Max. Month: 10.1 MG									
Average Monthly Use:		8.25	MG	Average Max. Daily: (Max Month/30): 0.34 MGD									
Average Daily Use:		0.28	MGD	Peak Day (Avg Daily Use* 1.8): 0.50 MGD 343.76 GPM									
Average Daily GPCD:		145	GPCD**	**Peak GPCD (Peak daily/avg population): 261 GPCD									
average daily GPCD based on water years 2004-2006 only)				(peak daily GPCD based on water years 2004-2006 only)									
Water Rights:				Projected Water Use:									
Priority	GPM	Source Stream		2030	2050								
1909	898	Bear Creek		404 GPM	469 GPM								
1912	898	Bear Creek		363 GPM	421 GPM								
1971	(permit for 1,000 AFT of storage and use at max rate of 2,244 GPM)				404 GPM	469 GPM							
Total	1,796												
	<u>Oct</u>	<u>Nov</u>	<u>Dec</u>	<u>Jan</u>	<u>Feb</u>	<u>Mar</u>	<u>Apr</u>	<u>May</u>	<u>Jun</u>	<u>Jul</u>	<u>Aug</u>	<u>Sep</u>	<u>Total</u>
Current Average Use													
(MG)	8.5	7.8	8.2	8.3	7.1	7.9	7.4	7.6	8.1	10.1	9.8	8.4	99.0
(GPM)	190	180	183	185	176	176	171	170	187	226	220	195	
Ratio	0.8	0.8	0.8	0.8	0.7	0.8	0.7	0.8	0.8	1.0	1.0	0.8	
Future Need (2050)													
(GPM)	395	362	379	384	330	366	343	353	376	469	457	392	
Current Rights													
(GPM)	1,796	1,796	1,796	1,796	1,796	1,796	1,796	1,796	1,796	1,796	1,796	1,796	
Deficit (#) or Surplus in 2050													
(GPM)	1,401	1,434	1,417	1,412	1,466	1,430	1,453	1,443	1,420	1,327	1,339	1,404	
(AFT/ month)	192	190	194	193	181	196	193	198	188	182	183	186	
MG = million gallons MGY = million gallons per year MGD = million gallons per day GPCD = gallons per capita day GPM = gallons per minute AFT = acre-feet													

Table 1.A-11: Drain current water use and future water use projections.

Oakland

The City of Oakland provided water service to an estimated 2006 population of 1,063 people. The average number of people per service is estimated at 2.57 people per service. Average annual water use for the last seven years totals 56.6 MGY. The average daily per capita need for 2006 is 179 GPCD. The estimated peak use is 321 GPCD, substantially higher than the estimate of 290 GPCD.

The projected population of the service area in 2050 is 1,530 people. Based on the peak estimate of 321 GPCD, the peak total future diversion need is 341 GPM during the month of July.

Oakland has a water right to divert 898 GPM from Calapooya Creek. The priority date of this right is 1909, one of the oldest municipal water rights in the County. The current right is adequate to provide for estimated future needs.

Name: City of Oakland		System Serves: Oakland		Services in 2006 = 420									
Populations: 2006 2030 2050		Annual Growth Rate: 1.0%		Average svcs = 420									
(water district) 1,063 1,318 1,530		(based on Douglas County Comprehensive Plan)		Average population = 1,063									
People/Svc = 2.53 (based on census 2000)													
Average Annual Use, 2000-2006: 56.56 MGY		Average Max. Month: 7.0 MG											
Average Monthly Use: 4.71 MG		Average Max. Daily: (Max Month/30): 0.23 MGD											
Average Daily Use: 0.16 MGD		Peak Day (Avg Daily Use* 1.8): 0.28 MGD		196.37 GPM									
Average Daily GPCD: 179 GPCD**		**Peak GPCD (Peak daily/population): 321 GPCD											
(** average daily GPCD based on water year 2006 only)		(**peak daily GPCD based on water year 2006 only)											
Water Rights:		Projected Water Use:		2030 2050									
Priority	GPM	Source Stream	Peak Day (GPCD) at 290	265 GPM	308 GPM								
1909	898	Calapooya Creek	Peak Day (GPCD) at 321	294 GPM	341 GPM								
			(highest) Use:	294 GPM	341 GPM								
Total	898												
Current Average Use													
	<u>Oct</u>	<u>Nov</u>	<u>Dec</u>	<u>Jan</u>	<u>Feb</u>	<u>Mar</u>	<u>Apr</u>	<u>May</u>	<u>Jun</u>	<u>Jul</u>	<u>Aug</u>	<u>Sep</u>	<u>Total</u>
(MG)	4.4	3.9	3.9	3.8	3.4	3.6	3.9	4.7	5.8	7.0	6.5	5.6	56.6
(GPM)	99	91	88	85	85	82	90	105	133	158	146	129	
Ratio	0.6	0.6	0.6	0.5	0.5	0.5	0.6	0.7	0.8	1.0	0.9	0.8	
Future Need (2050)													
(GPM)	214	190	190	183	167	177	189	228	280	341	316	269	
Current Rights													
(GPM)	898	898	898	898	898	898	898	898	898	898	898	898	
Deficit (#) / Surplus													
(GPM)	684	707	708	714	731	721	708	670	618	556	582	628	
(AFT/ month)	94	94	97	98	90	99	94	92	82	76	80	83	
MG = million gallons MGY = million gallons per year MGD = million gallons per day GPCD = gallons per capita day GPM = gallons per minute AFT = acre-feet													

Table 1.A-12: Oakland current water use and future water use projections.

Yoncalla

The City of Yoncalla water system serves an estimated population of 1,311 people based on 2.56 people per water service (this value includes users outside of the City limits). Average annual water use from 2000 to 2006 was 60.4 MGY and the average per capita daily use was 135 GPCD. The peak per capita daily use is estimated at 242 GPCD; substantially less than the average estimate of 290 GPCD. The lower value may be the result of the Yoncalla rate schedule that is designed to discourage excessive summer use.

The City of Yoncalla currently obtains approximately 75 percent of its water supply from Wilson Creek on a gravity fed system, and it pumps the rest from Adams Creek when flow in Wilson Creek is insufficient. The City has water rights allowing diversion of 790 GPM with priority dates senior to 1974 minimum flows. The City has a further 1980 priority right of 111.5 acre-feet of storage in Yoncalla Reservoir from Adams Creek that is junior to 1974 minimum flows in Elk Creek. However, the reservoir should be able to fill during wetter periods of the year when flow is adequate. The reservoir is located west of town near Wilson Creek. The existing water rights are adequate to supply current needs.

The future population served by the City water district in 2050 is expected to be 2,753 people. At a peak per capita need of 290 GPCD, the future peak diversion rate required is 554 GPM during August, and the total annual demand is 554 acre-feet.

Wilson Creek is a small tributary to Yoncalla Creek which is not always reliable. When water is not available from either Wilson or North Fork Wilson creeks in July through September, the City would have a deficit of 64 acre-feet of water. The 111.5 acre-foot storage in Yoncalla Reservoir is adequate to meet that shortfall. However, during very dry years when Adams Creek is also insufficient, the City has no reliable source of water with the exception of the Yoncalla Reservoir. The total deficit would be 203 acre-feet. After use of the City storage from the reservoir, the City would still have a total net deficit of 91 acre-feet.

During exceptionally dry years, flow in Wilson Creek and Adams Creek may not be adequate in June and/or October which may further add 55 and 66 acre-feet respectively to the deficit making the City's annual need 212 acre-feet.

Name: City of Yoncalla		System Serves: Yoncalla		Services in 2006 = 512										
Populations: 2006 2030 2050		Annual Growth Rate: 2.5%		Average svcs = 487										
(water district) 1,311 2,097 2,753		(based on Douglas County Comprehensive Plan)		Average population = 1,246										
People/Svc = 2.56 (based on census 2000)														
Average Annual Use, 2000-2006: 60.37 MGY		Average Max. Month: 8.1 MG												
Average Monthly Use: 5.03 MG		Average Max. Daily: (Max Month/30): 0.27 MGD												
Average Daily Use: 0.17 MGD		Peak Day (Avg Daily Use* 1.8): 0.30 MGD		209.61 GPM										
Average Daily GPCD: 135 GPCD		Peak GPCD (Peak daily/population): 242 GPCD												
Water Rights:														
Priority	GPM	Source Creek	Projected Water Use:		2030	2050								
1923	673	Adams, Wilson, N Fk Wilson	Peak Day (GPCD) at	290	422 GPM	554 GPM								
1940	117	Adams Creek	Peak Day (GPCD) at	242	353 GPM	463 GPM								
1980	111.5 ac-ft	Yoncalla Reservoir from Adams Cr	(highest)	Use:	422 GPM	554 GPM								
Total	790													
	<u>Oct</u>	<u>Nov</u>	<u>Dec</u>	<u>Jan</u>	<u>Feb</u>	<u>Mar</u>	<u>Apr</u>	<u>May</u>	<u>Jun</u>	<u>Jul</u>	<u>Aug</u>	<u>Sep</u>	<u>Total</u>	
Current Average Use														
(MG)	4.5	3.8	4.3	4.3	3.8	4.0	4.0	4.2	5.5	7.0	8.1	6.9	60.4	
(GPM)	102	89	96	97	94	90	92	93	126	156	182	159		
Ratio	0.6	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.7	0.9	1.0	0.8		
Future Need (2050)														
(GPM)	310	261	291	295	260	274	271	284	372	475	554	467		
(AFT/ month)	42	35	40	40	32	38	36	39	49	65	76	62	554	
Current Rights														
(GPM)	790	790	790	790	790	790	790	790	790	790	790	790		
Deficit (#) or Surplus														
(GPM)	480	529	499	495	531	516	519	506	418	316	236	323		
(AFT/ month)	66	70	68	68	66	71	69	69	55	43	32	43	720	
Deficit (#) or Surplus without Wilson Creek in July thru September													<u>Tot Deficit</u>	
(GPM)	480	529	499	495	531	516	519	506	418	(133)	(213)	(126)		
(AFT/ month)	66	70	68	68	66	71	69	69	55	(18)	(29)	(17)	(64)	
Deficit (#) or Surplus without Wilson or Adams creeks in July thru September														
(GPM)	480	529	499	495	531	516	519	506	418	(475)	(554)	(467)		
(AFT/ month)	66	70	68	68	66	71	69	69	55	(65)	(76)	(62)	(203)	
City Storage											65	46.5		
Net Deficit											(0)	(29)	(62)	(91)
<i>MG = million gallons MGY = million gallons per year MGD = million gallons per day GPCD = gallons per capita day GPM = gallons per minute AFT = acre-feet</i>														

Table 1.A-13: Yoncalla current water use and future water use projections.

Sutherlin

The Sutherlin water system serves an estimated 2006 population of 6,421 people based on an average of 2.46 people per service. Average annual water use over the last seven years amounts to 542.6 MGY. The average use per person is 251 GPCD and the peak daily requirement is estimated at 453 GPCD. Future peak water diversions based on the projected 2050 population of 14,048 will be 4,415 GPM in July and slightly less than that in August.

The City of Sutherlin has rights on Calapooya Creek, Cooper Creek, and the North Umpqua River. The City has also purchased an annual supply of 500 acre-feet from Cooper Creek Reservoir. Water rights on Calapooya Creek provide for a total diversion of 1,796 GPM with priority dates of 1924, 1941, and 1979. The 1979 right of 449 GPM is junior to 1974 minimum instream flows when available flow in Calapooya Creek is required to meet instream flow needs for aquatic life; thus the water right is for winter use only and is not available for municipal use from June through October.

The City has a right with a 1967 priority for 2,244 GPM from Cooper Creek. This source is used as backup to the supply from Calapooya Creek. When streamflow in Calapooya Creek is not adequate to meet City demand, water from Cooper Creek is used to supplement the need. During these times, the municipal demand by Sutherlin exceeds not only the supply from Calapooya Creek but often the flow typically present in Cooper Creek as well. The Cooper Creek right is considered unreliable during May through October. When these sources run short, storage from Cooper Creek Reservoir is used to supplement.

Sutherlin has an additional right to divert 1,347 GPM from the North Umpqua River under a 1979 priority. This supply has not been used to date. Costs of developing access to this water have been somewhat prohibitive and the need has not yet occurred. However, the City of Sutherlin is one of the fastest growing communities in the County. Peak future needs for Sutherlin show the current water rights from Calapooya and Cooper creeks and from Cooper Creek Reservoir will not meet the demand. Population estimates for the water district in 2050 are 14,048 people. Without development of the North Umpqua water right, peak use in July and August will not be met. A deficit of approximately 215 acre-feet per year is projected. Planning by the City and the Umpqua Basin Water Association is currently underway to have the UBWA divert this water at their point of diversion on the North Umpqua and pipe it to Sutherlin. Development of this water right should provide adequate water for the City through the year 2050. Although the North Umpqua water right is junior to 1974 instream minimum flows, it is senior to the higher 1991 instream flow requirement. Depending on other more senior rights on the North Umpqua River, Sutherlin will likely have enough water to meet its future peak demand. In addition, peak demand calculated for Sutherlin is much higher per capita (453 GPCD) than the County average of 372 GPCD. It is likely that a more efficient system or higher cost of water may reduce the peak per capita use rate allowing more buffer to meet peak future demand.

Name: City of Sutherlin		System Serves:		Sutherlin area		Services in 2006 =		2,610					
Populations:		<u>2006</u>	<u>2030</u>	<u>2050</u>	Annual Growth Rate:		2.7%		Average svcs =		2,488		
(water district)		6,421	10,581	14,048	(based on Douglas County Comprehensive Plan)				Average population =		6,120		
										(2002 to 2006)			
People/Svc =		2.46 (based on census 2000)											
Average Annual Use, 2000-2006:		542.57		MGY		Average Max. Month:		81.4 MG					
Average Monthly Use:		45.21		MG		Average Max. Daily: (Max Month/30):		2.71 MGD					
Average Daily Use:		1.51		MGD		Peak Day (Avg Daily Use* 1.8):		2.71 MGD		1,883.91		GPM	
**Average Daily GPCD:		251		GPCD		Peak GPCD (Peak daily/population):		453 GPCD					
										(** Average daily GPCD based on water years 2002-2006 only)			
										(** Peak daily GPCD based only on water years 2002-2006)			
Water Rights:						Projected Water Use:		<u>2030</u>		<u>2050</u>			
Priority	GPM	Stream source				Peak Day (GPCD) at	290	2,131 GPM		2,829 GPM			
1924	337	Calapooya Creek				Peak Day (GPCD) at	453	3,325 GPM		4,415 GPM			
1941	1,010	Calapooya Creek				(highest) Use:		3,325 GPM		4,415 GPM			
1967	2,244	Cooper Cr and Cooper Cr Reservoir											
1979	1,347	North Umpqua River											
1979	449	Calapooya Cr winter use only											
Total	5,386												
Current Average Use													
	<u>Oct</u>	<u>Nov</u>	<u>Dec</u>	<u>Jan</u>	<u>Feb</u>	<u>Mar</u>	<u>Apr</u>	<u>May</u>	<u>Jun</u>	<u>Jul</u>	<u>Aug</u>	<u>Sep</u>	<u>Total</u>
(MG)	38.3	32.1	32.8	32.3	28.9	33.6	33.3	41.5	55.4	81.4	80.0	52.8	542.6
(GPM)	859	743	734	725	716	753	772	930	1,283	1,824	1,793	1,223	
Ratio	0.5	0.4	0.4	0.4	0.4	0.4	0.4	0.5	0.7	1.0	1.0	0.6	
Future Need (2050)													
(GPM)	2,078	1,741	1,778	1,754	1,565	1,822	1,808	2,252	3,006	4,415	4,340	2,865	
Current Rights (without N Umpqua right)													
(GPM)	3,591	4,039	4,039	4,039	4,039	4,039	4,039	4,039	3,591	3,591	3,591	3,591	
Deficit (#) / Surplus (without N Umpqua right)													
(GPM)	1,512	2,299	2,262	2,285	2,475	2,218	2,232	1,787	585	(824)	(749)	725	
(AFT)	207	305	310	313	306	304	296	245	78	(113)	(103)	96	(215)
Current Rights (includes N Umpqua right)													
(GPM)	4,937	5,386	5,386	5,386	5,386	5,386	5,386	5,386	4,937	4,937	4,937	4,937	
Deficit (#) / Surplus (includes N Umpqua right)													
(GPM)	2,859	3,645	3,608	3,632	3,821	3,564	3,578	3,134	1,932	523	598	2,072	
(AFT)	392	483	494	498	473	488	474	429	256	72	82	275	
MG = million gallons MGY = million gallons per year MGD = million gallons per day GPCD = gallons per capita day GPM = gallons per minute AFT = acre-feet													

Table 1.A-14: Sutherlin current water use and future water use projections.

South Umpqua River /Cow Creek Sub-basins (D)

Roberts Creek Water District

The Roberts Creek Water District provides water service to the community of Green and to rural residents located upstream along Roberts Creek including Glengary. The estimated 2006 population served by the district is 7,483 people based on an average of 2.79 people per service. Average annual use for water years 2000 to 2006 was 410 MGY. The average daily per capita use in 2006 was 150 GPCD. The peak per capita use is 310 GPCD. To meet the needs of the projected 2050 population of 15,549 people, a peak diversion rate of 3,345 GPM will be required.

Roberts Creek Water District has water rights that total 2,160 GPM with priority dates of 1948, 1952, and 1973; all senior to most of the instream flow rights on the South Umpqua River.¹⁰ The 1952 right of 65 GPM is only available during the summer. The City of Roseburg also has a 1977 water right on the North Umpqua River of 449 GPM that is specifically designated to be used by the Roberts Creek Water District. The District has a total useable water right of 2,609 GPM for the summer months and 2,545 GPM for the rest of the year. With these levels of diversion, the District will not have adequate supply in July, August, and September to meet year 2050 peak need projections. The deficit is projected at 207 acre-feet annually.

Although the Roberts Creek Water District rights are senior to most established instream rights, there have been a number of years when exceptionally low flows in the South Umpqua River prompted the Watermaster to curtail diversions under the 1973 right. This happened at various times in July, August, and September during 1977, 1981, 1983, and 1987. Consequently, the 1973 water right of 1,796 GPM is considered unreliable in July, August, and September. Calculations of peak future demand that do not include the 1973 South Umpqua River water right during July, August, and September show a larger annual deficit of 937 acre-feet occurring in these same months. These rights appear adequate for meeting future needs in all other months.

Although the North Umpqua River right is junior to 1974 minimum flows, it is more reliable than the South Umpqua River rights since the North Umpqua River flows are more consistent throughout the summer than the South Umpqua River. The North Umpqua River has been regulated once in the last nine years. Regulation would typically start in mid- to late August and continue until October or later (City of Roseburg, 2007). If the North Umpqua River right is curtailed in August through October, the projected annual deficit in 2050 would increase to 1,058 acre-feet.

¹⁰ There is a small instream flow right from 1958.

The Roberts Creek Water District has a contract to purchase up to 750 acre-feet per year from Ben Irving Reservoir for municipal use. The following table shows the expected annual deficit projected in 2050 depending on curtailment of water rights. It is unlikely that the North Umpqua River water right would be curtailed but not the South Umpqua River. The additional 750 acre-feet of water reduces the annual peak deficit in 2050 to 308 acre-feet when both the 1973 and 1977 rights are curtailed. The annual deficit is reduced to 187 acre-feet when only the 1973 South Umpqua River right is curtailed.

Water right(s) curtailed	Projected annual deficit in year 2050 without storage (acre-feet)	Projected annual deficit in year 2050 with 750 acre-feet storage (acre-feet)
none	207	0
1973 South Umpqua only	937	187
1977 North Umpqua and 1973 South Umpqua	1,058	308

Table 1.A-15: Projected water deficit to meet year 2050 Roberts Creek Water District needs.

Although most of the water in Ben Irving Reservoir (about 75 percent) is currently designated for irrigation use, there is 1,500 acre-feet designated municipal, and 500 acre-feet designated as multi-purpose. All of the municipal water is currently under contract with Roberts Creek and Winston-Dillard water districts, but the 500 acre-feet of multi-purpose water is not obligated at this time. This water could be made available for additional municipal use eliminating any projected deficit. In addition, there appears to be ample water available in Ben Irving Reservoir to supply current and future irrigation needs in the Lookingglass sub-basin as well as meet municipal needs from the water districts. The Lookingglass-Olalla Water Control District and Douglas County could consider some of the water currently designated for irrigation to be re-designated for municipal use should the need arise.

Name: Roberts Creek Water District			System Serves: Green and along Roberts Creek			Services in 2006 = 2,682							
Populations: 2006 2030 2050			Annual Growth Rate: 2.45%			Average svcs = 2,682							
(water district) 7,483 11,883 15,549			(based on projected growth in between Roseburg and Winston in the Douglas County Comprehensive Plan)			Average population = 7,483							
People/Svc = 2.79 (based on census 2000)						(water year 2006 only)							
Average Annual Use, 2000-2006: 409.73 MGY			Average Max. Month: 53.9 MG										
Average Monthly Use: 34.14 MG			Average Max. Daily: (Max Month/30): 1.80 MGD										
Average Daily Use: 1.14 MGD			Peak Day (Avg Daily Use* 2.1): 2.39 MGD			1,659.80 GPM							
**Average Daily GPCD: 148 GPCD			<i>From 1984 Roseburg Treatment Plant Study:</i>										
(** average daily GPCD based on water year 2006 only)			<i>Peak Day = 2.1 * Avg Day</i>										
			**Peak GPCD (Peak daily/population): 310 GPCD										
			(**peak per capita day based on water year 2006 only)										
Water Rights:													
Priority	GPM	Source Stream				Projected Water Use:			2030	2050			
1948	301	S. Umpqua				Peak Day (GPCD) at 290			2,393 GPM	3,131 GPM			
1952	65	S Umpqua (June 15 - Sept 22)				Peak Day (GPCD) at 310			2,556 GPM	3,345 GPM			
1973	1,795	S Umpqua				(highest) Use:			2,556 GPM	3,345 GPM			
1977	449	* N Umpqua											
Total	2,609	(*water right diverted by City of Roseburg for Roberts Creek)											
	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Total
Current Average Use													
(MG)	32.8	25.9	26.6	25.2	25.6	24.4	26.6	31.1	41.1	53.9	53.1	43.5	409.7
(GPM)	735	599	596	564	635	546	616	696	950	1,207	1,191	1,008	
Ratio	0.6	0.5	0.5	0.5	0.5	0.5	0.5	0.6	0.8	1.0	1.0	0.8	
Future Need (2050)													
(GPM)	2,035	1,605	1,651	1,563	1,589	1,512	1,652	1,928	2,548	3,345	3,298	2,701	
Current Rights													
(GPM)	2,545	2,545	2,545	2,545	2,545	2,545	2,545	2,545	2,609	2,609	2,609	2,609	
Deficit (#) or Surplus													
(GPM)	509	940	894	981	955	1,033	893	617	61	(736)	(689)	(92)	
(AFT/ month)	70	125	122	134	118	141	118	84	8	(101)	(94)	(12)	(207)
Deficit (#) or Surplus (excluding 1973 right in summer)													
(GPM)	509	940	894	981	955	1,033	893	617	61	(2,531)	(2,484)	(1,887)	
(AFT/ month)	70	125	122	134	118	141	118	84	8	(347)	(340)	(250)	(937)
Deficit (#) or Surplus (excluding 1973 & 1977 rights in summer)													
(GPM)	60	940	894	981	955	1,033	893	617	61	(2,531)	(2,933)	(2,336)	
(AFT/ month)	8	125	122	134	118	141	118	84	8	(347)	(402)	(310)	(1,058)
MG = million gallons MGY = million gallons per year MGD = million gallons per day GPCD = gallons per capita day GPM = gallons per minute AFT = acre-feet													

Table 1.A-16: Roberts Creek Water District current water use and future water use projections.

Winston-Dillard Water District

The estimated population in 2006 of the Winston Dillard Water District was 5,742 people, with an average of 2.61 people per service. The average daily use per person for 2006 was 139 GPCD. Annual water use for the district for the last seven years (2000 to 2006) averaged 296.6 MGY. The peak per capita use is estimated to be 291 GPCD. The peak day diversion requirement to meet the projected 2050 population of 13,321 people is 2,694 GPM.

The District has water rights that total 1,867 GPM, all of which predate the 1974 and 1983 minimum instream flow requirements for aquatic life. However, the District's 1969 water right is junior to the 1958 instream flow requirement in the South Umpqua River. This right is not reliable during August since the South Umpqua River frequently has very low flows at that time. The City of Roseburg has a 1977 water right from the North Umpqua River of 898 GPM that is specifically designated for use by the Winston-Dillard Water District. Although this North Umpqua River right is junior to 1974 minimum flows, it is more reliable than the South Umpqua River rights since the North Umpqua River flows are more consistent throughout the summer than the South Umpqua River. The North Umpqua River has been regulated once in the last nine years. Regulation would typically start in mid- to late August and continue until October or later (City of Roseburg, 2007). Assuming a reliable North Umpqua River water right, the District has a total useable water right of 2,765 GPM throughout the year with the exception of August, when the available water right is 1,867 GPM.

The reliable water rights appear adequate to meet future peak demand in 2050 in all months except August. In addition, the surplus in July is only 71 GPM, which is not sufficient to cover possible variation in use or population growth. Future demand will exceed allowable diversions from both the North and South Umpqua rivers. The annual deficit is projected to be a minimum of 98 acre-feet, although an additional 100 acre-feet to insure adequate water during June and July is also recommended. Should the North Umpqua River water right become inadequate, deficits will occur throughout the summer from June through September with the additional loss of 898 GPM.

The District has an agreement with the Lookingglass-Olalla Water Control District for purchase of up to 750 acre-feet of water stored in Ben Irving Reservoir. The stored water would eliminate the projected deficit even if the North Umpqua water right should become unreliable in the future. Stored water from Ben Irving Reservoir should continue to be available for municipal use by the District. Although most of the water in the reservoir (about 75 percent) is currently designated for irrigation use, there is 1,500 acre-feet designated municipal, and 500 acre-feet designated as multi-purpose. All of the municipal water is currently under contract with Roberts Creek and Winston-Dillard water districts, but the 500 acre-feet of multi-purpose water is not obligated at this time. This water could be made available for additional municipal use eliminating any projected future deficit.

Name: Winston-Dillard			System Serves: Winston and Dillard			Services in 2006 = 2,200								
Populations: 2006 2030 2050			Annual Growth Rate: 3.00%			Average svcs = 2,200								
(water district) 5,742 9,876 13,321			(based on Douglas County Comprehensive Plan)			Average population = 5,742								
						(water year 2006 only)								
People/Svc = 2.61 (based on census 2000)														
Average Annual Use, 2000-2006: 296.57 MGY			Average Max. Month: 38.6 MG											
Average Monthly Use: 24.71 MG			Average Max. Daily: (Max Month/30): 1.29 MGD											
Average Daily Use: 0.82 MGD			Peak Day (Avg Daily Use* 2.1): 1.73 MGD 1,201.39 GPM											
**Average Daily GPCD: 139 GPCD			<i>From 1984 Roseburg Treatment Plant Study:</i>											
(** average daily GPCD based on water year 2006 only)			<i>Peak Day = 2.1 * Avg Day</i>											
			**Peak GPCD (Peak daily/population): 291 GPCD											
			(**peak per capita day based on water year 2006 only)											
Water Rights:														
Priority	GPM	Source Stream	Projected Water Use:			2030	2050							
1953	673	S Umpqua	Peak Day (GPCD) at 290			1,989 GPM	2,683 GPM							
1955	296	S Umpqua	Peak Day (GPCD) at 291			1,997 GPM	2,694 GPM							
1969	898	S Umpqua	(highest) Use: 1,997 GPM			1,997 GPM	2,694 GPM							
1977	898	*N Umpqua												
Total	2,765	(* water right diverted by City of Roseburg for Winston-Dillard)												
	<u>Oct</u>	<u>Nov</u>	<u>Dec</u>	<u>Jan</u>	<u>Feb</u>	<u>Mar</u>	<u>Apr</u>	<u>May</u>	<u>Jun</u>	<u>Jul</u>	<u>Aug</u>	<u>Sep</u>	<u>Total</u>	
Current Average Use														
(MG)	23.5	20.0	19.6	18.4	17.2	19.1	19.6	24.3	30.8	38.6	37.0	28.4	296.6	
(GPM)	527	463	438	412	426	428	454	545	714	864	829	658		
Ratio	0.6	0.5	0.5	0.5	0.4	0.5	0.5	0.6	0.8	1.0	1.0	0.7		
Future Need (2050)														
(GPM)	1,644	1,396	1,367	1,286	1,199	1,336	1,370	1,701	2,154	2,694	2,584	1,986		
Current Rights														
(GPM)	2,765	2,765	2,765	2,765	2,765	2,765	2,765	2,765	2,765	2,765	1,867	2,765		
Deficit (#) or Surplus														
(GPM)	1,121	1,369	1,398	1,479	1,566	1,429	1,395	1,064	611	71	(717)	779		
(AFT/ month)	154	181	192	203	194	196	185	146	81	10	(98)	103	(98)	
MG = million gallons MGY = million gallons per year MGD = million gallons per day GPCD = gallons per capita day GPM = gallons per minute AFT = acre-feet														

Table 1.A-17: Winston-Dillard Water District current water use and future water use projections.

Myrtle Creek

The City of Myrtle Creek provides water service to an estimated 2006 population of 3,409 people, based on an average of 2.55 people per service. Average annual use was 177.1 million gallons per year and the average daily use per person was 147 gallons per capita day between 2000 and 2006. The peak daily use was estimated at 309 gallons per capita day. At that peak rate, the peak day diversion requirement to meet the projected 2050 population of 7,160 people is 1,534 GPM.

Myrtle Creek has water rights totaling 3,552 GPM, of which 1,872 GPM are senior to all instream flow rights in the South Umpqua River. The 1978 water right of 680 GPM is primarily from an unnamed tributary to Harrison Young Branch in the North Myrtle Creek system.¹¹ This right is junior to downstream South Umpqua River 1974 instream rights, making it an unreliable source. The 1993 water right of 1000.9 GPM is only available January 1st through March 31st. During the summer low flow months on the South Umpqua River, 1,872 GPM is considered from reliable sources not likely to be curtailed. This amount appears adequate to meet peak future demands to 2050.

¹¹ An unnamed stream provides 600 GPM of this right while eight unnamed springs provide an additional 80 GPM of this right.

Name: Myrtle Creek			System Serves:		Myrtle Creek				Services in 2006 =				1,337	
Populations:		<u>2006</u>	<u>2030</u>	<u>2050</u>	Annual Growth Rate:		2.50%		Average svcs =		1,313			
(water district)		3,409	5,455	7,160	(based on Douglas County Comprehensive Plan)				Average population =		3,347			
		(2000 to 2006)												
People/Svc =		2.55 (based on census 2000)												
Average Annual Use, 2000-2006:		177.06		MGY		Average Max. Month:		26.2		MG				
Average Monthly Use:		14.76		MG		Average Max. Daily: (Max Month/30):		0.87		MGD				
Average Daily Use:		0.49		MGD		Peak Day (Avg Daily Use* 2.1):		1.03		MGD		717.26 GPM		
Average Daily GPCD:		147		GPCD		From 1984 Roseburg Treatment Plant Study:								
						Peak Day = 2.1 * Avg Day								
						Peak GPCD (Peak daily/population):		309		GPCD				
<u>Water Rights:</u>				<u>Projected Water Use:</u>				<u>2030</u>		<u>2050</u>				
Priority	GPM	Source Stream		Peak Day (GPCD) at		290	1,099 GPM		1,442		GPM			
1921	449	Harrison Young Branch		Peak Day (GPCD) at		309	1,169 GPM		1,534		GPM			
1944	22	Harrison Young Branch		(highest) Use:			1,169 GPM		1,534 GPM					
1945	54	Harrison Young Branch												
1947	1,347	S Umpqua River												
1978	680	unnamed stream & 8 springs												
1993	1,001	* Harrison Young Branch & 8 springs												
Total	3,552	(* available Jan 1st through Mar 31st)												
	<u>Oct</u>	<u>Nov</u>	<u>Dec</u>	<u>Jan</u>	<u>Feb</u>	<u>Mar</u>	<u>Apr</u>	<u>May</u>	<u>Jun</u>	<u>Jul</u>	<u>Aug</u>	<u>Sep</u>	<u>Total</u>	
Current Average Use														
(MG)	13.3	11.3	10.6	10.5	9.3	10.5	10.2	13.4	18.6	26.2	25.7	17.4	177.1	
(GPM)	299	262	238	235	232	235	237	300	431	587	575	402		
Ratio	0.5	0.4	0.4	0.4	0.4	0.4	0.4	0.5	0.7	1.0	1.0	0.7		
Future Need (2050)														
(GPM)	781	662	621	616	547	614	600	786	1,090	1,534	1,505	1,017		
Current Rights														
(GPM)	2,552	2,552	2,552	3,552	3,552	3,552	2,552	2,552	1,872	1,872	1,872	1,872		
Deficit (#) or Surplus														
(GPM)	1,770	1,889	1,930	2,937	3,005	2,938	1,952	1,766	782	337	367	854		
(AFT/ month)	243	250	264	402	372	403	259	242	104	46	50	113		
MG = million gallons MGY = million gallons per year MGD = million gallons per day GPCD = gallons per capita day GPM = gallons per minute AFT = acre-feet														

Table 1.A-18: Myrtle Creek current water use and future water use projections.

Tri City Water District

The Tri City Water District serves the urban unincorporated area of Tri City. The estimated 2006 population of the District is 3,810 people based on an average of 2.54 people per service. Average annual water use for 2000 through 2006 was 197.3 MGY. The per capita daily average is only 137 GPCD. Peak daily per capita use is estimated at 283 GPCD during July and August. This peak use rate is lower than the 290 GPCD estimate since the daily average is low. For calculations of meeting future peak demand, the more conservative peak use rate of 290 GPCD is used. The future 2050 population of the District is estimated at 8,001 people. To adequately provide water for that population, the peak diversion need is projected to be 1,611 GPM.

The District has water rights with priority dates of 1952 and 1956 that total 648 GPM of which 56 GPM is only available during the irrigation season.¹² The District also has a right to divert up to 1,346 GPM with a priority date of 1973, and up to 191 GPM with priority 1979. Due to the flow regime in the South Umpqua River, the 1979 right is considered unreliable during July through October and the 1973 right is unreliable in August and September.

The water rights appear to be adequate to meet year 2050 demand in all months except August and September when both the 1973 and 1979 rights are not reliable. The annual deficit is projected at 193 acre-feet per year. The Tri City Water District currently purchases 95 acre-feet of water from Galesville Reservoir which should help supplement this deficit. However, assuming the water from Galesville Reservoir is available, there is still a 98 acre-foot annual deficit projected in 2050 when the 1973 right is curtailed.

¹² The Tri City Water District recently transferred 143.6 GPM of irrigation rights to municipal use under a priority of 1956 increasing that right from 449 GPM previously.

Name: Tri City		System Serves: Myrtle Creek, Riddle, and Canyonville areas		Services in 2006 = 1,500									
Populations: 2006 2030 2050		Annual Growth Rate: 2.50%		Average svcs = 1,500									
(water district) 3,810 6,096 8,001		(based on average projected growth of Myrtle Creek, Riddle and Canyonville in the Douglas County Comprehensive Plan)		Average population = 3,810									
People/Svc = 2.54 (based on census 2000 for 3 cities)													
Average Annual Use, 2000-2006: 197.33 MGY		Average Max. Month: 25.0 MG											
Average Monthly Use: 16.44 MG		Average Max. Daily: (Max Month/30): 0.83 MGD											
Average Daily Use: 0.55 MGD		Peak Day (Avg Daily Use* 2.1): 1.15 MGD		799.37 GPM									
**Average Daily GPCD: 137 GPCD		**Peak GPCD (Peak daily/population): 283 GPCD											
(** average daily GPCD based on water year 2006 only)		(** peak daily GPCD based on water year 2006 only)											
Water Rights:		Projected Water Use:											
Priority	GPM	Source Stream	Peak Day (GPCD) at 290	2030	2050								
1952	56	S Umpqua	Peak Day (GPCD) at 283	1,228 GPM	1,611 GPM								
1956	592	S Umpqua	(highest) Use:	1,197 GPM	1,571 GPM								
1973	1,346	S Umpqua		1,228 GPM	1,611 GPM								
1979	191	S Umpqua											
		95 ac-ft purchased from Galesville Reservoir											
Total	2,186												
	<u>Oct</u>	<u>Nov</u>	<u>Dec</u>	<u>Jan</u>	<u>Feb</u>	<u>Mar</u>	<u>Apr</u>	<u>May</u>	<u>Jun</u>	<u>Jul</u>	<u>Aug</u>	<u>Sep</u>	<u>Total</u>
Current Average Use													
(MG)	14.7	13.3	14.0	13.6	12.4	13.5	13.2	15.8	19.6	25.0	24.0	18.3	197.3
(GPM)	330	309	313	305	307	303	305	353	453	561	537	423	
Ratio	0.6	0.5	0.6	0.5	0.5	0.5	0.5	0.6	0.8	1.0	1.0	0.7	
Future Need (2050)													
(GPM)	948	859	898	877	796	871	849	1,014	1,260	1,611	1,544	1,177	
Current Rights													
(GPM)	1,995	2,130	2,130	2,130	2,130	2,130	2,130	2,186	2,186	1,995	649	649	
Deficit (#) or Surplus													
(GPM)	1,047	1,271	1,231	1,253	1,334	1,259	1,281	1,171	926	384	(896)	(528)	
(AFT/ month)	143	168	169	172	165	172	170	160	123	53	(123)	(70)	(193)
MG = million gallons MGY = million gallons per year MGD = million gallons per day GPCD = gallons per capita day GPM = gallons per minute AFT = acre-feet													

Table 1.A-19: Tri-City Water District current water use and future water use projections.

Riddle

The City of Riddle diverts water from Cow Creek and several tributaries of Cow Creek to serve an estimated 2006 population of 1,720 people based on an average of 2.66 people per service. Average daily use per person over the last seven years is estimated at 182 GPCD. The projected peak use per person is 381 GPCD. The City's average annual growth rate is projected at 1.50 percent. At this growth rate, the population served by the water district in 2050 would be 2,972 people. The peak diversion rate in 2050 would be 787 GPM.

The City has water rights that total 2,581 GPM with priority dates of 1909, 1912, 1947, and 1980.¹³ The 1,346 GPM from the 1980 right is junior to 1958 and 1974 minimum instream flows. Due to the flow regime in Cow Creek the 1980 right is considered unreliable during the months of July through October. This reduces the current rights to 1,234 GPM during the peak use period. This appears adequate to meet the year 2050 peak demand. The City also purchases 10 acre-feet of water from Galesville Reservoir. This stored water provides a buffer for when some of the smaller streams are inadequate such as Spring Branch, a tributary to Judd Creek. It will also provide additional water for increases in population growth or water use beyond those predicted.

¹³ The City also diverts water for the South Umpqua Water Association's 1970 water right. That water right is shown in the assessment of water for the South Umpqua Water Association.

Name: City of Riddle			System Serves: Riddle		Services in 2006 = 673								
Populations: 2006 2030 2050			Annual Growth Rate: 1.50%		Average svcs = 606								
(water district) 1,790 2,435 2,972			(based on Douglas County Comprehensive Plan)		Average population = 1,612								
					(2000 to 2006)								
People/Svc = 2.66 (based on census 2000)													
Average Annual Use, 2000-2006: 105.38 MGY			Average Max. Month: 12.3 MG										
Average Monthly Use: 8.78 MG			Average Max. Daily: (Max Month/30): 0.41 MGD										
Average Daily Use: 0.29 MGD			Peak Day (Avg Daily Use* 2.1): 0.61 MGD		426.89 GPM								
Average Daily GPCD: 182 GPCD			Peak GPCD (Peak daily/population): 381 GPCD										
Water Rights:			Projected Water Use:		2030 2050								
Priority	GPM	Source Stream	Peak Day (GPCD) at 290	490 GPM	598 GPM								
*1909	337	Spring Branch and Judd Creek	Peak Day (GPCD) at 381	645 GPM	787 GPM								
1912	449	Russell Creek	(highest) Use: 645 GPM	645 GPM	787 GPM								
1947	449	Cow Creek											
1980	1,346	Cow Creek											
		10 ac-ft purchased from Galesville Reservoir											
Total	2,581												
* water right held in name of Ernest D. Riddle for Riddle municipal use													
	<u>Oct</u>	<u>Nov</u>	<u>Dec</u>	<u>Jan</u>	<u>Feb</u>	<u>Mar</u>	<u>Apr</u>	<u>May</u>	<u>Jun</u>	<u>Jul</u>	<u>Aug</u>	<u>Sep</u>	<u>Total</u>
Current Average Use													
(MG)	7.9	7.2	7.7	7.8	7.8	7.6	7.8	8.6	9.8	12.3	11.5	9.3	105.4
(GPM)	178	167	173	175	193	169	181	193	227	276	258	215	
Ratio	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.7	0.8	1.0	0.9	0.8	
Future Need (2050)													
(GPM)	508	462	493	499	497	483	500	551	626	787	735	593	
Current Rights													
(GPM)	1,234	2,581	2,581	2,581	2,581	2,581	2,581	2,581	2,581	1,234	1,234	1,234	
Deficit (#) or Surplus													
(GPM)	726	2,119	2,088	2,081	2,084	2,098	2,081	2,029	1,955	447	500	641	
(AFT/ month)	100	281	286	285	258	287	276	278	259	61	68	85	
MG = million gallons MGY = million gallons per year MGD = million gallons per day GPCD = gallons per capita day GPM = gallons per minute AFT = acre-feet													

Table 1.A-20: Riddle current water use and future water use projections.

South Umpqua Water Association

The South Umpqua Water Association serves an estimated 2006 population of 795 people based on an estimated 2.66 people per service. The service area is mostly outside Riddle with some customers near Canyonville. Average daily use per person is estimated at only 76 GPCD. This is substantially lower than all of the other municipalities and water districts. The water user population is rural, and the use is quasi-municipal indicating some use is likely a mix of domestic and other uses such as irrigation of yards and small gardens rather than strictly municipal. Rural customers often have well water and use of the Water Association water is supplemental to developed wells or springs on the property. This is likely why the average per capita use is so low.

The projected peak use per person is 157 GPCD. The Association's average annual growth rate is projected at 1.50 percent. At this growth rate, the population served by the Water Association in 2050 would be 1,320 people. Assuming the peak use rate increases to 290 GPCD, the peak diversion rate in 2050 would be 266 GPM in August.

The Association has a 1970 water right for 301 GPM from Cow Creek that is diverted by the City of Riddle and sent to the Water Association. This water right is junior to 1958 minimum instream flows on Cow Creek and is not considered reliable in the month of August. The water right adequately meets future peak demand for all months except August. The projected annual deficit in 2050 is 36 acre-feet. The South Umpqua Water Association purchases up to 30 acre-feet of water annually from Galesville Reservoir that may help to supplement the shortage. However, even with this purchased water, an annual deficit of 6 acre-feet is projected. The South Umpqua Water Association could choose to purchase more water from Galesville to accommodate the shortfall.

Name: South Umpqua Water Association				System Serves: Area near Riddle and some near Canyonville (outside City limits)				Services in 2006 = 299					
Populations: 2006 2030 2050				Annual Growth Rate: 1.50%				Average svcs = 299					
(water district) 795 1,082 1,320				(based on projected growth of Riddle in Douglas County Comprehensive Plan)				Average population = 795 (water year 2006 only)					
People/Svc = 2.66 (based on census 2000)													
Average Annual Use, 2000-2006: 20.79 MGY				Average Max. Month: 2.9 MG									
Average Monthly Use: 1.73 MG				Average Max. Daily: (Max Month/30): 0.10 MGD									
Average Daily Use: 0.06 MGD				Peak Day (Avg Daily Use* 2.1): 0.12 MGD				84.20 GPM					
**Average Daily GPCD: 76 GPCD				**Peak GPCD (Peak daily/population): 157 GPCD									
(** average daily GPCD based on water year 2006 only)				(** peak daily GPCD based on water year 2006 only)									
				Projected Water Use:				2030 2050					
Water Rights:				Peak Day (GPCD) at 290				218 GPM 266 GPM					
Priority GPM Source Stream				Peak Day (GPCD) at 157				118 GPM 144 GPM					
1970 301 Cow Creek				Use: 218 GPM				266 GPM					
30 ac-ft purchased from Galesville Reservoir													
Total 301													
Current Average Use													
	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Total
(MG)	1.6	1.4	1.4	1.5	1.4	1.3	1.4	1.6	2.0	2.3	2.9	2.0	20.8
(GPM)	35	33	31	34	34	30	33	35	46	52	64	47	
Ratio	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.6	0.7	0.8	1.0	0.7	
Future Need (2050)													
(GPM)	146	133	128	140	128	124	133	147	186	216	266	190	
Current Rights													
(GPM)	301	301	301	301	301	301	301	301	301	301	0	301	
Deficit (#) or Surplus													Total
(GPM)	155	167	173	161	173	176	168	154	115	85	(266)	111	deficit
(AFT/ month)	21	22	24	22	21	24	22	21	15	12	(36)	15	(266)
													(36)
MG = million gallons MGY = million gallons per year MGD = million gallons per day GPCD = gallons per capita day GPM = gallons per minute AFT = acre-feet													

Table 1.A-21: South Umpqua Water Association current water use and future water use projections.

Glendale

The estimated 2006 population served by the City of Glendale is 1,029 people based on an average of 2.75 people per service. The average annual use is 66.3 MGY and the average use per person is 190 GPCD. Peak daily use per person is estimated at 394 GPCD. The 2050 projected population is 1,481 people served by the City. The peak diversion requirement to meet the needs in July of 2050 will be 405 GPM in July.

The City of Glendale diverts water directly from Cow Creek and from several small Cow Creek tributaries including Mill Creek, Section Creek, and Stranns Spring. The City has developed a two acre reservoir on Section Creek and another two acre reservoir on Mill Creek. The total water rights for the City of Glendale amount to 1,445 GPM. However, due to the flow regimes in Mill and Section creeks, available water from those sources amounts to only about 45 GPM during the low flow period. In addition, the Cow Creek water right is junior to minimum instream flows from 1958 and is not reliable during low flow periods. Consequently during the summer from July through September, the current water rights amount to only 269 GPM plus the 4 AFT of storage in the reservoirs.

Consequently, the available water from existing water rights will not be adequate to meet the peak needs in 2050 for the months of July, August, and September. The annual deficit is expected to be 41 acre-feet. The City currently stores four acre-feet in Mill Creek and Section Creek reservoirs. Use of that water brings the annual expected deficit to 37 acre-feet. Glendale currently purchases 40 acre-feet of water from the Galesville Reservoir. Given the County policy of retaining 500 acre-feet of storage in Galesville for municipal and industrial needs in this portion of the Cow Creek sub-basin, an adequate supply may be acquired by the City to meet its future needs. With continued use of current purchased water levels from Galesville, the City should meet its peak demand throughout the year in 2050.

Name: City of Glendale			System Serves: Glendale		Services in 2006 = 374									
Populations:		<u>2006</u>	<u>2030</u>	<u>2050</u>	Average svcs = 367									
(water district)		1,029	1,275	1,481	Average population = 1,009									
		Annual Growth Rate: 1.00%												
		(based on Douglas County Comprehensive Plan)												
		(2004 to 2006)												
People/Svc =		2.75 (based on census 2000)												
Average Annual Use, 2000-2006:		66.34	MGY	Average Max. Month: 7.0 MG										
Average Monthly Use:		5.53	MG	Average Max. Daily: (Max Month/30): 0.23 MGD										
Average Daily Use:		0.18	MGD	Peak Day (Avg Daily Use* 2.1): 0.39 MGD 268.74 GPM										
**Average Daily GPCD:		190	GPCD	**Peak GPCD (Peak daily/population): 394 GPCD										
(** average daily GPCD for water years 2004-2006 only)		(** peak daily GPCD for water years 2004-2006 only)												
Water Rights:														
Priority	GPM	Source Stream		Projected Water Use:										
1906	337	Section Creek		Peak Day (GPCD) at 290	2030 257 GPM									
1920	121	Mill Creek		Peak Day (GPCD) at 394	2050 298 GPM									
1928	224	Stranns Spring		(highest) Use: 349 GPM	405 GPM									
1954	135	Section Creek and Glendale Reservoir (2 AFT)			405 GPM									
1959	449	Mill Creek and Mill Creek Reservoir (2 AFT) -subject to minimum flows of 11 cfs at mouth of Cow Creek												
1973	180	Cow Creek												
Total	1,445													
	<u>Oct</u>	<u>Nov</u>	<u>Dec</u>	<u>Jan</u>	<u>Feb</u>	<u>Mar</u>	<u>Apr</u>	<u>May</u>	<u>Jun</u>	<u>Jul</u>	<u>Aug</u>	<u>Sep</u>	<u>Total</u>	
Current Average Use														
(MG)	5.3	4.7	4.9	5.4	5.0	5.3	5.0	5.5	6.1	7.0	6.5	5.7	66.3	
(GPM)	118	110	109	122	123	118	116	124	141	156	146	131		
Ratio	0.8	0.7	0.7	0.8	0.7	0.8	0.7	0.8	0.9	1.0	0.9	0.8		
Future Need (2050)														
(GPM)	306	275	283	316	288	305	290	320	354	405	378	329		
Current Rights														
(GPM)	1,445	1,445	1,445	1,445	1,445	1,445	1,445	1,445	1,445	269	269	269		
Deficit (#) or Surplus														
(GPM)	1,139	1,170	1,162	1,129	1,157	1,140	1,155	1,125	1,091	(135)	(108)	(60)		
(AFT/ month)	156	155	159	155	143	156	153	154	145	(19)	(15)	(8)	(41)	
Storage (Mill Cr Reservoir & Glendale Reservoir 2 AFT each)														
Net Deficit											4			
											(15)	(15)	(8)	(37)
MG = million gallons MGY = million gallons per year MGD = million gallons per day GPCD = gallons per capita day GPM = gallons per minute AFT = acre-feet														

Table 1.A-22: Glendale current water use and future water use projections.

South Umpqua Tributaries / Lookingglass Creek Sub-basins*Canyonville*

The City of Canyonville served water to an estimated population of 1,501 people in 2006 based on an average of 2.41 people per service. Average annual water use from 2000 through 2006 was 151.7 MGY, and the per capita average daily use was 294 GPCD. The current peak rate of diversion is estimated at 618 GPM in July and August. This peak rate is substantially higher than most water districts in the Basin. The City provides water to the Seven Feathers Hotel and Casino, and several associated businesses at the truck stop which may inflate the average rate of use per person.

The City has water rights with priority dates of primarily 1927, 1929, 1948, 1951, 1969, and 1977. There are also two small water rights with priority dates of 1912 and 1947 that total 12 GPM available during the irrigation season only. However, the 1977 water right for 449 GPM on Canyon Creek is not reliable during July, August, and September since it is junior to 1974 minimum instream flows on the South Umpqua River. This leaves 920 GPM in available water right during the peak season. The City constructed Win Walker Reservoir on Canyon Creek in 1981 with financial assistance from Douglas County and Farmers Home Administration. The reservoir has a storage capacity of 300 acre-feet, and together with water rights on Canyon Creek provides the primary water source for the City of Canyonville.

The water rights from O'Shea Creek total 450 GPM. These water rights have not been used in recent years due to the system needing upgrades. Over the last four years, the City has been replacing rusted pipe and upgrading the diversion site to enable use of O'Shea Creek again. Although not immediately necessary to meet current demand, the additional source is desirable as a backup in the event that Canyon Creek becomes contaminated; a real possibility as Interstate 5 crosses the creek below Win Walker Reservoir nine times increasing the likelihood of contamination from an accident. The final upgrades to the O'Shea Creek Project are anticipated in 2007 (Skoog 2006).

The projected population served by the City of Canyonville in 2050 is 3,814 people. The peak diversion requirement at that time is calculated at 1,636 GPM. The City's water rights appear adequate to meet the needs of the projected population except in July, August, and September, when approximately 223 acre-feet of stored water from Win Walker Reservoir will be necessary to augment allowable diversions. The amount of storage appears adequate to meet the City's future needs.

Name: City of Canyonville		System Serves: Canyonville		Services in 2006 = 623									
Populations: 2006 2030 2050		Annual Growth Rate: 3.50%		Average svcs = 594									
(water district) 1,501 2,763 3,814		(based on Douglas County Comprehensive Plan)		Average population = 1,432									
				(2000 to 2006)									
People/Svc = 2.41 (based on census 2000)													
Average Annual Use, 2000-2006: 151.70 MGY		Average Max. Month: 18.9 MG											
Average Monthly Use: 12.64 MG		Average Max. Daily: (Max Month/30): 0.63 MGD											
Average Daily Use: 0.42 MGD		Peak Day (Avg Daily Use* 2.1): 0.88 MGD		614.54 GPM									
Average Daily GPCD: 294 GPCD		Peak GPCD (Peak daily/population): 618 GPCD											
Water Rights:		Projected Water Use:		2030 2050									
Priority	GPM	Source Creek	Peak Day (GPCD) at 290	556 GPM	768 GPM								
**1912	5	Canyon Creek	Peak Day (GPCD) at 618	1,185 GPM	1,636 GPM								
1927	11	Canyon Creek	(highest) Use:	1,185 GPM	1,636 GPM								
1929	180	O'Shea Creek											
**1947	7	Canyon Creek											
1948	180	O'Shea Creek											
1951	90	O'Shea Creek											
1969	449	Canyon Creek											
1977	449	Canyon Creek											
1981	300 acre-feet	Win Walker Reservoir on Canyon Creek											
Total	1,369												
** to be used during irrigation season only													
	<u>Oct</u>	<u>Nov</u>	<u>Dec</u>	<u>Jan</u>	<u>Feb</u>	<u>Mar</u>	<u>Apr</u>	<u>May</u>	<u>Jun</u>	<u>Jul</u>	<u>Aug</u>	<u>Sep</u>	<u>Total</u>
Current Average Use													
(MG)	11.3	10.1	9.8	10.4	9.7	10.3	10.8	12.6	15.0	18.9	18.5	14.3	151.7
(GPM)	253	234	220	233	240	231	251	281	347	424	415	331	
Ratio	0.6	0.5	0.5	0.6	0.5	0.5	0.6	0.7	0.8	1.0	1.0	0.8	
Future Need (2050)													
(GPM)	975	873	848	900	837	891	936	1,085	1,294	1,636	1,599	1,235	
Current Rights													
(GPM)	1,369	1,358	1,358	1,358	1,358	1,369	1,369	1,369	1,369	920	920	920	
Deficit (#) or Surplus													
(GPM)	394	485	509	458	520	478	432	284	75	(716)	(679)	(315)	
(AFT/ month)	54	64	70	63	64	66	57	39	10	(98)	(93)	(42)	(223)
Reservoir Storage										300			77
MG = million gallons MGY = million gallons per year MGD = million gallons per day GPCD = gallons per capita day GPM = gallons per minute AFT = acre-feet													

Table 1.A-23: Canyonville current water use and future water use projections.

1.B. Rural Domestic

The phrase “rural domestic water use” is used to denote the water needs of those persons who obtain water from individual sources, and are not served by any water vending entity. In many of the sub-basins, such as Smith River or Cow Creek, areas are large and population densities will likely remain relatively small. In these cases, water supply problems are expected to remain at the individual nuisance level, such as the finding of high iron content wells.

According to the Douglas County Planning Department, the unincorporated areas of the County have historically had a larger proportion of the population than the incorporated areas. However, this situation is anticipated to change over the next 20 years with areas within the city urban growth boundaries receiving up to 60 percent of the future County growth (Douglas County Planning Department, 2004). Therefore most of the expanded water use needs will likely occur within water service areas. In addition, some of the rural areas outside urban growth boundaries already receive water service from various water associations.

1.B.1. Current Rural Domestic Water Use

Rural population levels are relatively high in sub-basins such as those in the central portion of the County. Although the majority of growth is expected within water service areas, severe problems already exist in areas such as Willis and Rice Creek located south of Dillard. Water is available for purchase from Galesville Reservoir for areas closer to the South Umpqua River and from Ben Irving Reservoir primarily for those located in the Lookingglass Watershed. However, access to water for those residences located further up many watersheds may prove increasingly difficult.

In order to analyze the current rural domestic use and project future demand, several factors are considered. The population of each sub-basin; the portion of that population served by current water services; the portion served by current domestic surface water rights; and the assumption that the remaining population is served by other means such as ground water wells. This information is listed in Table 1.B-1.

Sub-basin population estimates are based on 2000 U.S. census data by block surveyed. These are estimates rather than exact populations since census block areas do not correspond to sub-basin boundaries. The water service area populations are calculated by the census population data that is within a water service area. There may be some residents within a water service area that have surface rights or wells and do not purchase water from the service. This may result in some underestimates of rural domestic users; although the amount is not expected to be significant.

Item	Sub-basins					
	A	B	C	D	E	F
Total Population ¹	6,299	21,037	9,456	48,699	13,823	710
Population receiving water service ²	4,914	14,758	4,767	42,970	11,354	0
Total rural domestic water users	1,385	6,279	4,689	5,729	5,562	710
Number of domestic surface water rights ³	139	682	168	366	254	17
People per water right ⁴	2.9	2.9	2.9	2.9	2.9	2.9
Population on domestic surface water rights	403	1,978	487	1,061	737	49
Population on well water ⁵	982	4,301	4,202	4,668	4,825	661
¹ 2000 U.S. Census data. ² Based on population data (2000 census) located within a water service area boundary. Not all households may be connected to the service. ³ Obtained from State Water Rights Information System database available at www.wrd.state.or.us/OWRD/ ⁴ Based on County average number of people per family from U.S. Census 2000 survey. ⁵ Difference between "Total rural domestic water users" and "Population on domestic surface water rights."						

Table 1.B-1: Estimates of rural domestic populations (not connected to water services) by surface water and ground water use.

The numbers of domestic surface water rights in the sub-basin were obtained from the Oregon Water Resources Water Right Information System database. Assuming that each domestic water right serves an average of one family, and the average family size in Douglas County is 2.9, an estimate of the population served by domestic surface water rights is given. The remaining population is reliant on ground water wells and water haulers.

The following series of maps (Figure 1.B-1 through Figure 1.B-6) show population densities relative to water service areas and urban areas within each sub-basin. These maps show where concentrations of the population occur outside city limits, water service areas, and urban growth boundaries. These concentrated rural domestic populations are where future growth may put pressure on ground water supplies.

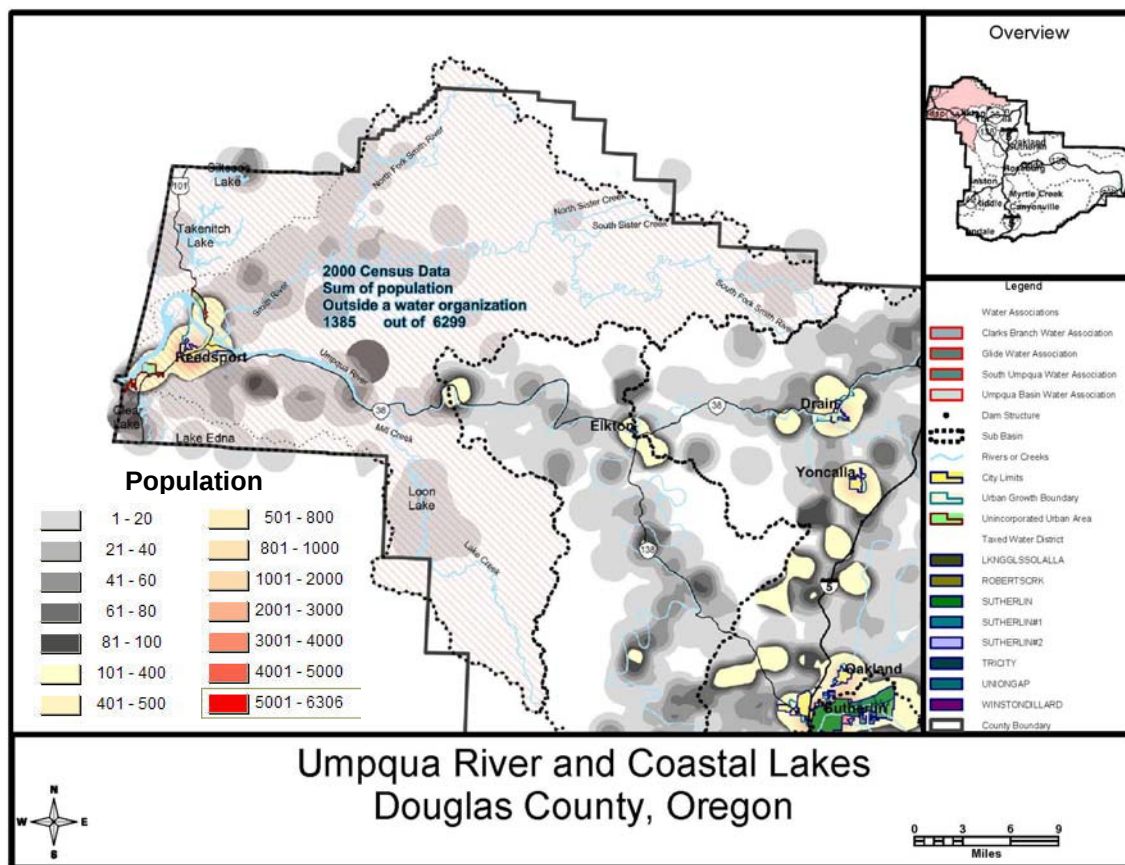
Sub-basin A

Figure 1.B-1: Sub-basin A population density relative to urban and water service areas.

The majority of the population in Sub-basin A occurs within, and immediately surrounding Reedsport. In total, about 22 percent of the population (1,385 people) is not on water service. About 403 of those people (29 percent) access water via domestic surface water rights, while the remaining 982 people (71 percent) are presumed to primarily use ground water wells.¹⁴

Approximately 261 people reside in the coastal area outside the Umpqua Basin, where there is no water service. The remaining over 1,120 people are within the Umpqua Basin with no service. The rural population is located in some concentrations near Scottsburg and outside Reedsport. The rest is spread out along the lower Umpqua River, Smith River including the lower portions of North and South Fork Smith River, around Loon Lake, and around the coastal lakes with the highest levels around Clear Lake.

¹⁴ Some rural domestic users may pay to have water trucked in during some periods of the year.

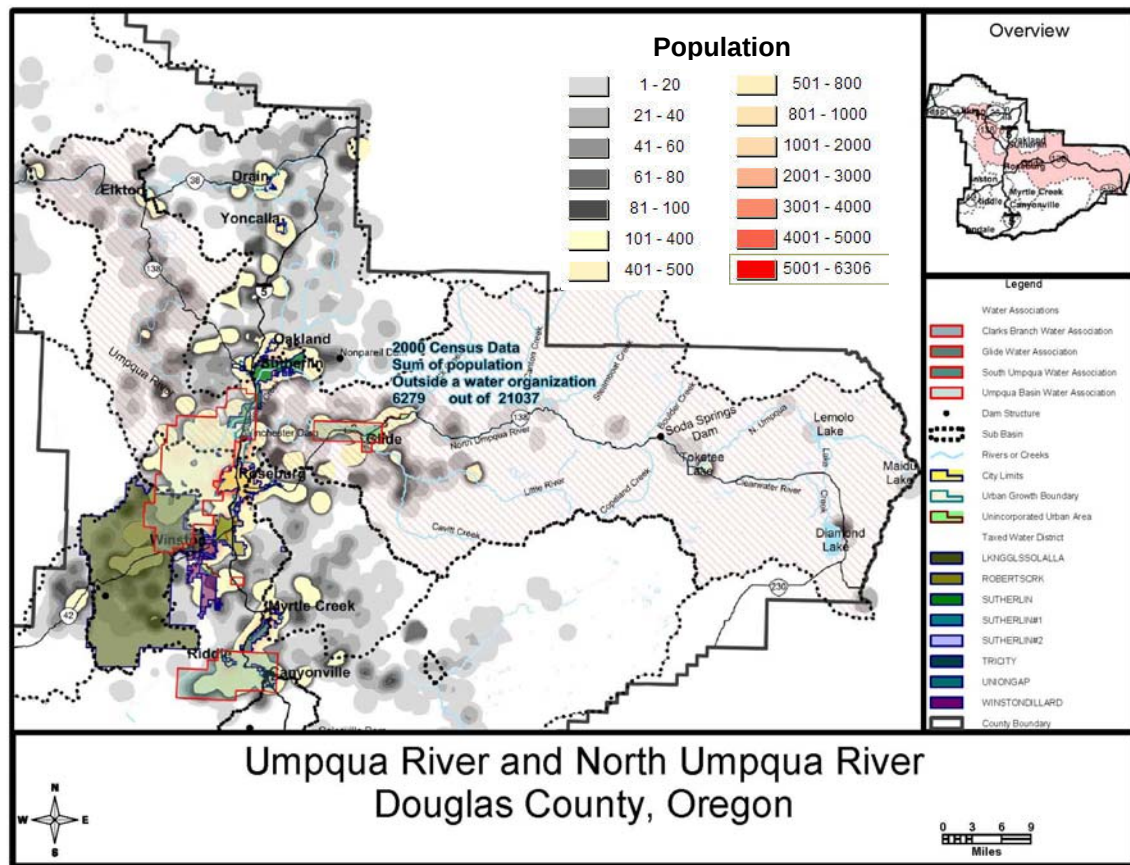
Sub-basin B

Figure 1.B-2: Sub-basin B population density relative to urban and water service areas.

Over 6,200 people (30 percent) in sub-basin B are considered rural domestic users that do not receive water service. Over 30 percent of the rural domestic users obtain water via domestic surface water rights, while 70 percent are presumed on well water.

Most of these rural residents live along the Umpqua River; on the outskirts of Sutherlin; in Winchester; around Glide; and out the Cavitt Creek and Little River drainages. Relatively few residents reside above Glide in the North Umpqua River sub-basin with small exceptions around Diamond and Toketee lakes. Many residents in the highest concentration areas around Sutherlin, Glide, and Winchester may eventually be included in nearby water service areas, especially where growth in these areas is significant.

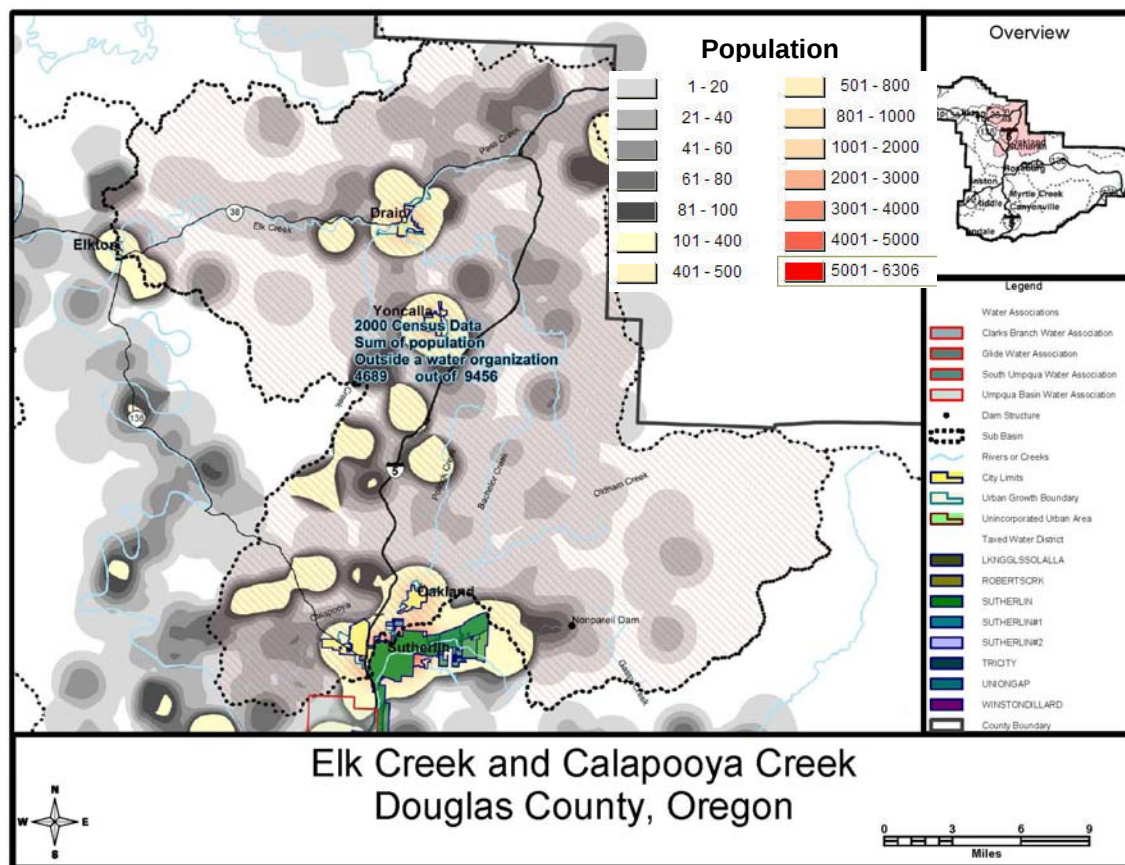
Sub-basin C

Figure 1.B-3: Sub-basin C population density relative to urban and water service areas.

Sub-basin C has the highest proportion of residents not within a water service area. Nearly 4,700 people (50 percent) are considered rural domestic users within the sub-basin. Only 10 percent of the rural domestic users obtain water via domestic surface water permits while 90 percent are dependent on wells.

Figure 1.B-3 shows concentrations of these residents surrounding each of the communities in the sub-basin. These concentrations extend for over a mile beyond the city limits in Drain, Yoncalla, Oakland, Elkton, and portions of Sutherlin. Other significant concentrations occur east of Drain along Elk Creek; the Rice Hill and Rice Valley areas near I-5 south of Yoncalla; the Yellow Creek Mountain area west of Rice Hill; Dodge Canyon along Highway 138; and the Cole Road development to the west.

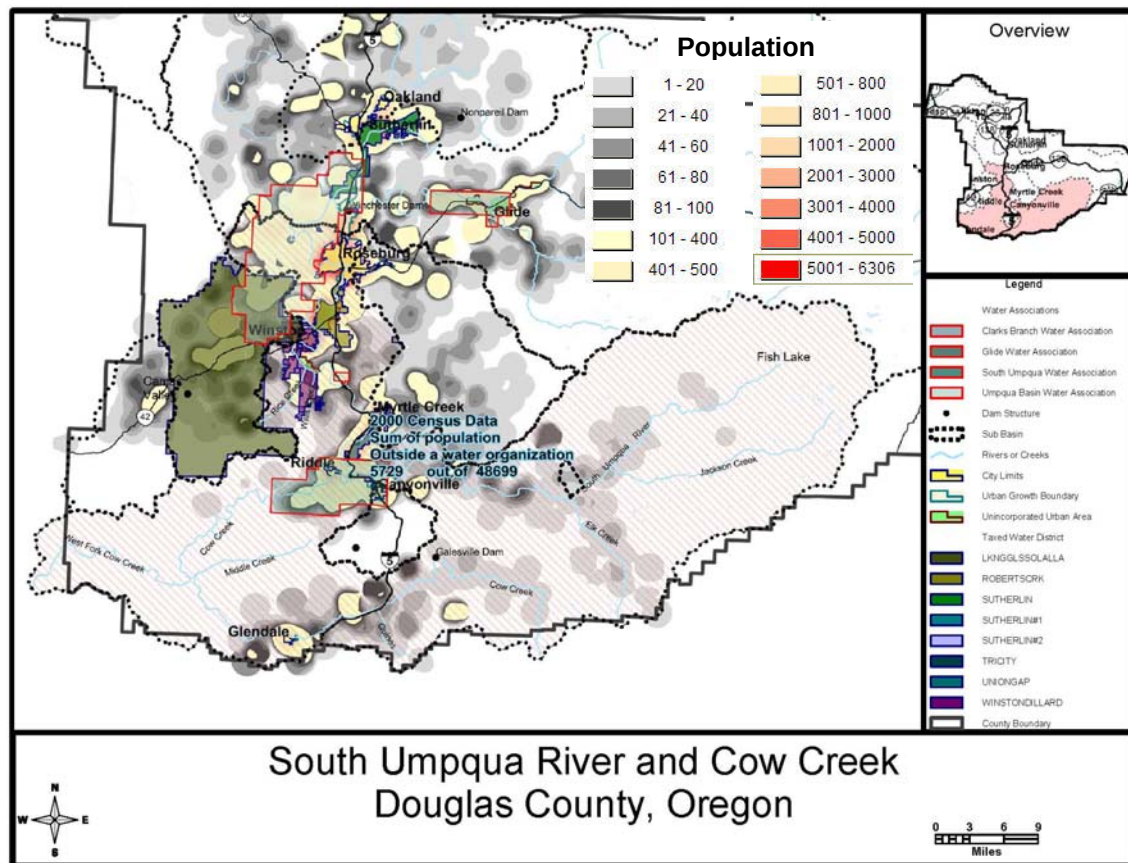
Sub-basin D

Figure 1.B-4: Sub-basin D population density relative to urban and water service areas.

Sub-basin D has the highest concentration of the County's population but the lowest percentage of rural domestic users with fewer than 12 percent depending on ground water or domestic surface rights. Although a small percentage, this still amounts to over 5,700 people. Figure 1.B-4 shows these concentrations all along the South Umpqua River with most residing between Roseburg and Canyonville. Some domestic use however continues upriver to the confluence with Dumont Creek. Elk Creek also has somewhat sparse but continuous development. Cow Creek has concentrated rural domestic development from east of Glendale to the Galesville Dam with concentrations near Fortune Branch, Galesville, and Azalea. Somewhat sparse development continues up Cow Creek above the dam. An area with over 100 people also occurs south of the dam near Cedar Springs Mountain.

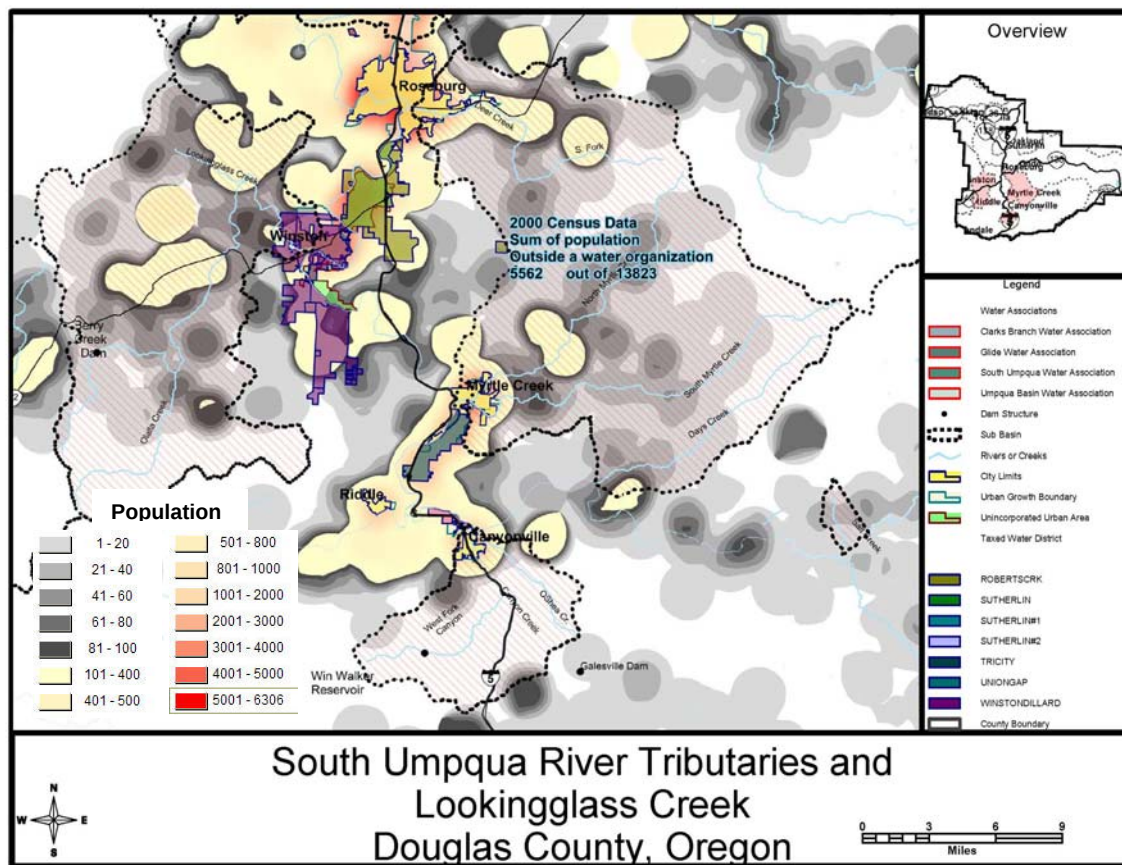
Sub-basin E

Figure 1.B-5: Sub-basin E population density relative to urban and water service areas.

In Sub-basin E, approximately 40 percent are considered rural domestic water users. The Lookingglass Olalla Water Control Board regulates the water from Ben Irving Reservoir (Berry Creek Dam). The water from the reservoir is designated for residents within the Lookingglass Creek Watershed. However, the control board is not a water service provider and thus residents within this area are considered rural domestic users with the exception of those in the lower watershed along Lookingglass Creek that are within the Umpqua Basin Water Association area.

The total number of rural domestic residents within the sub-basin is 5,562. Approximately 13 percent of those residents obtain water via surface water permits while 87 percent are dependent on ground water.

Over 3,000 of the rural domestic users live in the Lookingglass Creek Watershed within the area covered by the Lookingglass Olalla Water Control Board. Areas in the Lookingglass Creek Watershed with the highest density include Tenmile along Highway 42, and to the north along Sugar Pine Ridge and Porter Creek. Most of the Myrtle Creek and Deer Creek

drainages have rural domestic residents throughout with the highest concentrations around the City of Myrtle Creek; about five miles up North Myrtle Creek near Big Lick Creek; along lower Deer Creek through Dixonville; and on South Fork Deer Creek. The Canyon Creek and Salt Creek watersheds have somewhat smaller populations with the exception of the areas adjacent to Canyonville.

Sub-basin F

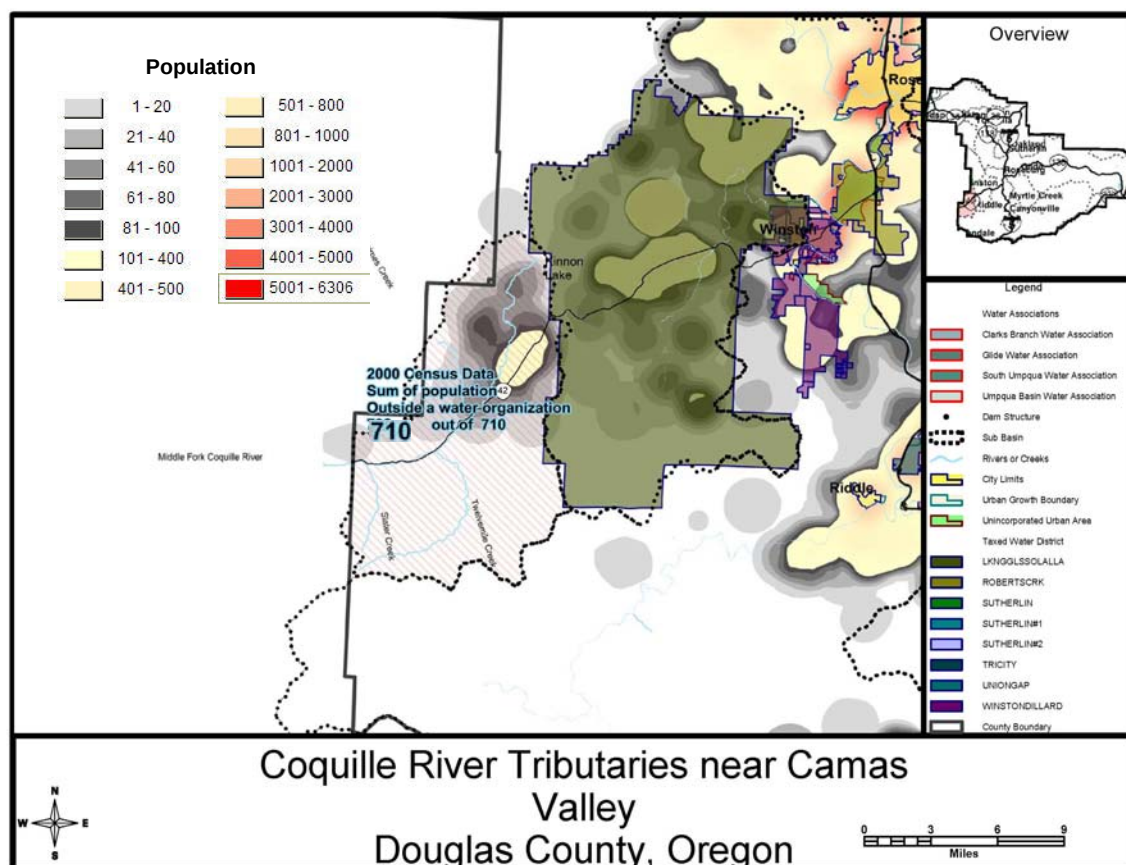


Figure 1.B-6: Sub-basin E population density relative to urban and water service areas.

There is no water service available in Camas Valley. All 710 residents are considered rural domestic water users. The majority of the population is centered on Highway 42 along the Middle Fork Coquille River.

1.B.2. Future Rural Domestic Water Use

The Douglas County Planning Department estimates average annual growth in Douglas County at 1.50 percent; lower than most of the municipal areas assessed previously. However, this increase will put additional pressure on water needs by rural domestic users. Although most current rural domestic users are on well water, the larger population seeking

ground water will cause additional pressure on ground water reserves, many of which are directly attached to surface water flows. Some areas will not have sufficient ground water for adequate wells and pressure on both surface water and ground water will occur. Therefore rural domestic water users of surface and ground water are combined to assess the future peak needs.

The rural domestic populations in each sub-basin are projected to the year 2050 based on the predicted County average annual growth of 1.5 percent in Table 1.B-2. The total projected monthly and annual water use by rural domestic users for the County are then summarized for these populations by sub-basin. The total annual water use estimates are the sums of monthly use. Peak monthly need is based on 290 GPCD and reflects not only household use, but irrigation of gardens and other rural type water uses.

Year	Sub-basin A	Sub-basin B	Sub-basin C	Sub-basin D	Sub-basin E	Sub-basin F
Rural domestic population						
2000	1,385	6,279	4,689	5,729	5,562	710
2050	2,424	10,988	8,206	10,026	9,734	1,243
Month	Projected rural domestic water use in 2050¹ (acre-feet)					
October	39	154	154	158	144	20
November	32	125	133	126	120	16
December	32	134	145	133	118	17
January	32	131	145	131	120	16
February	26	105	114	110	98	14
March	32	134	137	131	119	16
April	32	130	130	130	116	16
May	39	165	146	168	150	21
June	39	206	166	206	191	26
July	65	303	216	276	269	34
August	58	297	219	269	263	33
September	45	196	179	198	180	25
Total annual need	471	2,080	1,885	2,035	1,888²	253
¹ Projected water use is based on average peak use of 290 GPCD.						
² Over 50 % are in the Lookingglass Creek Watershed, and are eligible for water from Ben Irving Reservoir. However, not all are downstream of the dam.						

Table 1.B-2: Year 2050 projected rural population and rural domestic water use by sub-basin.

Rural domestic use is often dependent on ground water wells and springs, in addition to rivers and streams. Risk of contamination to ground water and surface water caused by effluent discharges from public sewer systems or raw sewage from failing private septic tank or drain fields, may increase as the population increases throughout the County

including rural areas. Contamination of sources could pose a threat to existing water supplies further reducing the available water.

1.C. Industrial

Approximately 3,130 acres are designated for industrial use in the rural unincorporated areas of Douglas County with about 2,700 acres (86 percent) currently developed. Most of this designated industrial land is located in the central valley from the Sutherlin/Roseburg area to the Riddle area (Douglas County 2006). However, most cities throughout the County have some industrial zone development and many have city water rights for industrial use.

Basic industries in Douglas County include businesses in the lumber and wood products industry, agriculture, tourism, mining and mineral processing, and commercial fishing sectors. Other secondary industries include those in trade and services, construction, and the transportation, communication, and utilities sectors. Over two-thirds of the County economy depends directly or indirectly on the wood products industry (Douglas County 2006).

The majority of the past industrial water use in the basin has been for lumber and wood products processing mills that included ponds. With dramatic reductions in timber harvest on primarily federal land, many mills and wood manufacturing facilities have closed within the last 30 years; at least five mills have closed since the 1980s. There are currently 16 mills operating in Douglas County.¹⁵ These mills have established water rights to meet their water use needs including sprinkler systems in the log yards, log ponds, and some manufacturing.

There has been a rapid increase in wine production and land conversion to vineyard. This has also led to numerous wineries opening in the County. According to the Umpqua Valley Winegrowers Association, there are currently about 20 wineries operating in the County and that number is expected to dramatically increase over the next several years. Umpqua Community College is introducing a new program in Viticulture and Enology that is expected to help expand the industry within the County. Water use for irrigation is covered in Appendix I and water consumption for wine production and winery use is not expected to be high.

Information on industrial development is from Umpqua Economic Development Partnership (UEDP), the 2006 Douglas County Comprehensive Plan, Umpqua Valley Winegrowers Association, Douglas Timber Operators, and the previous water management plan.

Industrial Parks Development

The loss of a large portion of the wood products industry prompted County officials to attract other types of manufacturing industry to Douglas County. The County purchased

¹⁵Bob Ragon, Executive Director, Douglas Timber Operators, personal communication (6/20/07).

large blocks of land creating industrial parks in five locations throughout the County. Money has been spent to prepare these sites to meet industry needs such as roads, sewer lines, and in some cases water and wetland surveys. Several new industries have moved into these parks but there is still room for more in most sites.

In April, 2003 American Bridge Manufacturing built a facility on 40 acres of Bolon Island, an industrial park located near Reedsport in the coastal sub-basin. A pellet mill operation is currently considering another site on Bolon Island. In the Sutherlin Industrial Park, Orenco Systems Inc., Garden Valley Corporation, Umpqua Resources, and Double R Manufacturing have all established operations. A short distance further south the Wilbur-Winchester Park is home to Alcan Cable, Bayliner, and the Weyerhaeuser pole yard. South of Roseburg in the Oak Creek Industrial Park, Ingram Book Distribution Center is the only industry. In the South Umpqua Valley Industrial Park near Riddle, Roseburg Trailer Works and WinCo Foods are operating. Alfa Leisure, a manufacturer of recreational vehicles is currently planning to occupy the last available space at this site.

In addition to the County developed industrial parks, there are a number of privately owned areas zoned for industrial use. One of the largest sites in the County is 120 acres located on Del Rio Road along the Umpqua River. This is a desirable site with both rail and highway access, but is limited by its lack of available water and sewer. Recently a large warehouse distribution center showed interest in the site. However, the lack of readiness due to water and sewer was a deterrent.

Biomass Energy Production

There is growing interest in biomass energy production by Federal, State and local politicians, as well as local community members. The operation has potential to reduce our dependence on non-renewable energy, provide a means to reduce fuel-loading and fire risk on our forest land, and provide economic opportunities in rural areas that have an abundance of tree waste products that can fuel these systems. Wood waste is burned in boilers or furnaces. The heat is applied to water to produce steam that turns turbines to produce electricity. Some local mills have already installed small biomass energy plants fueled by mill wastes to power their operations.

The Oregon Forest Resources Institute commissioned a study in 2006 on the feasibility of producing biomass energy in Oregon (Mason, Bruce & Girard et al 2006). In that study, the authors report a conservative estimate of 20 bone dry tons (BDTs) of fuel is available in the 18 Oregon Counties analyzed. They conclude that Oregon could use one BDT per year to produce 150 MW of electrical power per year, with a stable fuel supply for more than 20 years.¹⁶ They also found that Douglas County has by far the highest amount of acreage available and the largest volume available to support biomass energy production, as well as road infrastructure to access the supply.

Based on the study, it is reasonable to assume that Douglas County could support two energy plants that produce 10 to 15 MW of electricity per year. Since it is important for

¹⁶ The study did not factor in continued growth on these lands.

these plants to be located near their fuel source, one would likely be located in the southern portion of the County along the South Umpqua River near Cow Creek and another could be located further north near the North Umpqua corridor. These sites could also use existing mills that have interest and capability to expand for power production.

Water is necessary to produce steam and cool the system. Most of the water used can be re-used over and over reducing the consumptive use of the system. However, water may need to be cooled before running back into the stream. Small amounts of water are lost to evaporation. Estimates of total water used are about 20 acre-feet per MW per year but are reduced to 0.008 acre-feet when water is re-used.¹⁷ This would amount to 0.144 acre-feet for each plant at 18 MW produced, a very small requirement overall.

The two industrial sites along the South Umpqua River owned by the County have water rights associated with them that would adequately meet these needs. The South Umpqua Valley Industrial Site has a 1993 water right from the South Umpqua River of 0.8 cfs from December 1st through April 30th. During the rest of the year when water is low in the South Umpqua, the County has a contract to buy water from Galesville of up to 95 acre-feet. The Oak Creek industrial site has a 1994 water right on the river of 2.02 cfs and another on Cow Creek for .01 cfs useable from January 1st to April 30th. It also has a year around right to use up to 306.2 acre-feet from Galesville. These industrial water rights for the Oak Creek site are also used for irrigation and would need to be shared. Still both sites appear to have ample water.

Location of a new biomass electrical plant near the North Umpqua corridor may not be feasible since the County has no water right for this use and streamflow levels on the North Umpqua River in the summer may not be reliable. However, a likely proposal would be to add the biomass electrical production capability to an existing mill, several of which are ideally located for this in this area. Two possibilities are Glide Lumber, owned by the Swanson Group located along the North Umpqua River in Glide, and Douglas County Forest Products in Winchester.

Douglas County Forest Products along with Roseburg Forest Products and DR Johnson Lumber Company currently produce biomass energy that provides power to their mills.¹⁸ One existing byproduct from this energy production is excess steam. Manufacturers need to find use for the steam to heat buildings, kilns or other types of use. These mill sites, as well as several others located along the South Umpqua already hold industrial water rights that may supply the needs of a biomass electric plant.

Other Future Industry

The 1989 Water Resources Management Program report included water use estimates for other industrial users such as sand and gravel processing and a large food processing plant. Those estimates are still considered valid for planning purposes. Sand and gravel mining from rivers is becoming more restrictive and is unlikely to expand. However, there is still

¹⁷ Information from the Environmental Working Group Report; Green Energy Guide; A Consumer's Guide to Sustainable Electricity located at www.EWG.org.

¹⁸ Bob Ragon, Executive Director, Douglas Timber Operators, personal communication (6/20/07).

need for the material. This may cause more expansion of mining into rock pits around the County. Barging material from Canada where restrictions on dredging are less significant may be considered.¹⁹

Two pellet mills are being considered for establishment on Bolon Island and in Oakland. A recreational vehicle manufacturer is planning to move into the South Umpqua Valley industrial park. These industries are not expected to require significant amounts of water. Anticipated water use needs that are not currently in water rights are listed by sub-basin in Table 1.C-1.

Stream	Industry	Water use (acre-feet)						
		May	June	July	Aug	Sept	Oct	Total
Coastal / Umpqua River sub-basin								
Umpqua River	sand & gravel	160	240	320	320	320	240	1,600
Umpqua River / North Umpqua River sub-basin								
North Umpqua River	biomass energy ¹	25	25	25	25	25	25	150
Elk and Calapooya creeks sub-basin								
Elk Creek	sand & gravel	25	25	25	25	25	25	150
Calapooya Creek	sand & gravel	25	25	25	25	25	25	150
South Umpqua River / Cow Creek sub-basin								
South Umpqua River	sand & gravel	14	23	30	30	30	23	150
	food processing	40	112	112	112	112	112	600
	biomass energy ¹	25	25	25	25	25	25	150
Cow Creek	sand & gravel	16	22	30	30	30	22	150

¹ Estimates for non-consumptive use are 300 AFT per year (20 AFT per MW per year) in total for the County. From Pacific Northwest River Basins Commission Report cited in 1989 Water Resources Management Plan. Consumptive use could be less than 0.2 acre-feet per year.

Table 1.C-1: Potential future industrial water use needs by sub-basin and stream.

1.D. Flow Augmentation for Water Quality

The 1989 Water Resources Management Plan analyzed flow augmentations on each stream that received discharge from a sewage treatment facility in the sub-basins. In response to a mandate by the State of Oregon and the Department of Environmental Quality, the Roseburg Urban Sanitary Authority (RUSA) was required at that time, to augment streamflow in the South Umpqua River. Through a long-term agreement with the County, RUSA purchased up to 3,500 acre-feet of water annually from Galesville Reservoir for release to augment flows in the South Umpqua River. Streamflow augmentation was a method used to dilute discharge concentrations from the treatment plant. The expectation

¹⁹ Helga Conrad, Umpqua Economic Development Program, personal communication (4/23/07).

was that as the population in the County continued to grow, so would sewage treatment facilities. It was reasonable to assume that flow augmentation would become likely on other streams where sewage treatment plants discharged effluent.

However, this mandate no longer exists. The Umpqua Basin TMDL proposes to regulate effluent concentrations from sewage treatment facilities through its wastewater permitting process. The requirements, if any will include upgrades to facilities and specific treatment options of effluent to minimize nutrient loading into the streams. These requirements will vary by each wastewater permitted facility, and will be phased in as the permits are updated. Therefore streamflow augmentation to meet water quality standards is not required at this time.

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